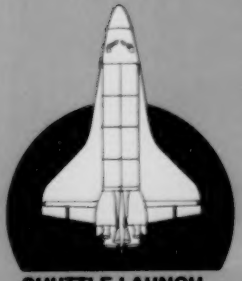
VOLUME 18 / NUMBER 24
DECEMBER 23, 1980
ACC. NOS. N80-33336 TO N80-34339

STAR
AN ABSTRACT JOURNAL

Scientific and Technical Aerospace Reports



SHUTTLE LAUNCH
MARCH 1981

PRODUCED BY THE
SCIENTIFIC AND TECHNICAL
INFORMATION
BRANCH

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WHAT YOU CAN DO FOR *STAR*

All users of this abstract service are urged to forward reports to be considered for announcement in *STAR*. This will aid NASA in its efforts to provide the fullest possible coverage of all scientific and technical publications that might support aeronautics and space research and development. If you have prepared relevant reports (other than those that you will transmit to NASA, DoD, or DOE through the usual contract- or grant-reporting channels), please send them for consideration to the NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Maryland 21240.

Reprints of journal articles, book chapters, and conference papers are also welcome. These will be considered for announcement in *STAR's* companion journal, *International Aerospace Abstracts*.

You may specify a particular source to be included in a report announcement if you wish; otherwise the report will be placed on public sale at the National Technical Information Service. Copyrighted publications will be announced but not distributed or sold.

PURCHASE OF *STAR*

The semimonthly issues and the cumulative index issues are available postpaid on subscription and in single copy from the Superintendent of Documents, United States Government Printing Office, Washington, D.C., 20402, United States of America.

Semimonthly issues...

Annual subscription rates: $60.00 domestic; $75.00 foreign. Price per single copy: $2.50 domestic; $3.15 foreign.

Cumulative index issues, semiannual and annual...

Annual subscription rates for both: $25.00 domestic; $31.25 foreign. Price per single copy: semiannual $9.50 domestic, $11.90 foreign; annual $16.00 domestic, $20.00 foreign.

Domestic subscription rates...

Apply to the United States, Canada, Mexico, and all Central and South American countries, except as noted below.

Foreign subscription rates...

Apply to Argentina, Brazil, French Guiana, Guyana, Surinam, Belize, and all other countries throughout the world.

Payment should be by check, money order, or document coupons, and must accompany order. Remittances from foreign countries should be made by international money order or draft on an American bank, payable to the Superintendent of Documents, or by UNESCO book coupons.

PUBLISHED BY:

UNITED STATES GOVERNMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SCIENTIFIC AND TECHNICAL INFORMATION BRANCH
Scientific and Technical Aerospace Reports, Volume 18, is prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by PRC Data Services Company.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through June 30, 1981.

US ISSN 0036-8741

INTRODUCTION

Scientific and Technical Aerospace Reports (STAR) is a major component of a comprehensive National Aeronautics and Space Administration information system covering aeronautics, space, and supporting disciplines. *STAR* is issued on the 8th and 23rd of each month and announces current publications of the following types:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms
- Translations in report form
- NASA-owned patents and patent applications
- Dissertations and theses

Cumulative index volumes are published semiannually and annually.

Journal, book, and conference literature, cover-to-cover journal translations, and certain foreign dissertations are announced in a companion journal, *International Aerospace Abstracts (IAA)*, available on subscription from the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

ON-GOING RESEARCH PROJECTS

By arrangement between NASA and the Smithsonian Science Information Exchange (SSIE), a separate section of information on aerospace-related *On-Going Research Projects* is inserted into each issue of *STAR*. The insert presents titles of active NASA grants and university contracts, summary portions of recently updated *NASA Research and Technology Objectives and Plans (RTOPs)*, and notices of non-NASA research projects that were funded in the most recent or current fiscal year. The latter are selected by SSIE. The project announcements in the insert are arranged by *STAR* divisions but are otherwise entirely separate from *STAR*. They are not indexed nor machine-searchable by NASA. Current and retrospective searches are available from SSIE, 1730 M Street, N.W., Washington, D.C. 20036.

SUBJECT SCOPE

Subject scope of *STAR*, *IAA*, and *On-Going Research Projects* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

OTHER NASA PUBLICATIONS

Other NASA publications and information services are described in the publication, *The NASA Scientific and Technical Information System ... and How to Use It*, available without charge from the NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Maryland 21240.

HOW TO USE STAR SUBJECT CATEGORIES

STAR is categorized by 10 major subject divisions divided into 74 specific subject categories and one general category/division. The major subject divisions are listed in the Table of Contents, together with a note for each that defines its scope and provides any cross-references. For example:

AERONAUTICS

Includes aeronautics (general), aerodynamics, air transportation and safety, aircraft communications and navigation, aircraft design, testing and performance, aircraft instrumentation, aircraft propulsion and power, aircraft stability and control, and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces, and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

CROSS-REFERENCES

Individual *STAR* abstracts are not ordinarily cross-referenced, except for certain conference reports or book translations that have had separate abstracts written for their component papers or chapters. Citations and abstracts of the components follow immediately after those of the parent document. When the subject content of a component differs sufficiently from the general content of the parent, a cross-reference citation also is printed at the end of the category to which it normally would have been assigned if it were independent.

DOCUMENTS ON MICROFICHE

Documents on microfiche[1] are designated by a pound sign (#) following the accession number. The pound sign is used without regard to the source or quality of the microfiche.

AVAILABILITIES

One or more sources from which a document announced in *STAR* is available to the public is given in each citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26:1 reduction).

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page vii.

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Section, Springfield, Va. 22161.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $3.50 price, for those documents identified by a # symbol.)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: Fachinformationszentrum, Karlsruhe. Sold by the Fachinformationszentrum Energie, Physik, Mathematik GMBH, Eggenstein Leopoldshafen, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of 50 cents each, postage free. (See discussion of patents and patent applications below.)

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number (which appears in lieu of the report number in other indexes), the U.S. Patent Number, the U.S. Patent Application Serial Number, and the U.S. Patent Class. Patent applications for which patents have not yet been issued are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

NASA *patent application specifications* are sold in paper copy by the National Technical Information Service at price code A02 ($5.00 domestic; $10.00 foreign). Microfiche are sold at price code A01 ($3.50 domestic; $5.25 foreign). The US-Patent-Appl-SN- number should be used in ordering either paper copy or microfiche from NTIS. Printed copies of *patents* (which are not microfiched) are available for purchase at 50 cents per copy from:

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the Patent and Trademark Office. The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

Assistant General Counsel for Patent Matters/Code GP-1
National Aeronautics and Space Administration
Washington, D.C. 20546

ELIGIBILITY AND REGISTRATION FOR NASA INFORMATION PRODUCTS AND SERVICES

A variety of services, in addition to the distribution of NASA scientific and technical reports and of *STAR* and its cumulative indexes, is available to organizations of the following types that have registered with NASA to receive specific services or products:

1. NASA offices, research centers, contractors, subcontractors, grantees, and consultants;

2. Other U.S. Government agencies and their contractors;
3. Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public reference;
4. Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research;
5. Organizations abroad that have established reciprocal document exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA products and services. Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or for further information to:

NASA Scientific and Technical Information Facility
Attn.: Registration Activity
P.O. Box 8757
B.W.I. Airport, Maryland 21240

Organizations abroad should direct requests to the same address, but to the attention of: International Exchange Program.

AVAILABILITY OF STAR ABSTRACTS ON MICROFICHE

Microfiche of the abstract sections of this issue ahd other issues of *STAR* are available on annual subscription from NTIS, Attn: Subscriptions, 5285 Port Royal Road, Springfield, Virginia 22161. Annual subscription rates are $45.00 North America; $90.00 foreign. Abstract sections for previous years retroactive to 1964 are available at the current rates. Microfiche for individual *STAR* issue abstract sections are not available.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
555 West 57th Street, 12th Floor
New York, New York 10019

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents and
Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

ESA-Information Retrieval Service
ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 8757
B. W. I. Airport, Maryland 21240

National Aeronautics and Space
Administration
Scientific and Technical Information
Branch (NST-41)
Washington, D.C. 20546

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey
1033 General Services Administration
Building
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

Fachinformationszentrum Energie, Physik,
Mathematik GMBH
7514 Eggenstein Leopoldshafen
Federal Republic of Germany

NTIS PRICE SCHEDULES

Schedule A

STANDARD PAPER COPY PRICE SCHEDULE

(Effective January 1, 1980)

Price Code	Page Range	North American Price	Foreign Price
A01	Microfiche	$ 3.50	$ 5.25
A02	001-025	5.00	10.00
A03	026-050	6.00	12.00
A04	051-075	7.00	14.00
A05	076-100	8.00	16.00
A06	101-125	9.00	18.00
A07	126-150	10.00	20.00
A08	151-175	11.00	22.00
A09	176-200	12.00	24.00
A10	201-225	13.00	26.00
A11	226-250	14.00	28.00
A12	251-275	15.00	30.00
A13	276-300	16.00	32.00
A14	301-325	17.00	34.00
A15	326-350	18.00	36.00
A16	351-375	19.00	38.00
A17	376-400	20.00	40.00
A18	401-425	21.00	42.00
A19	426-450	22.00	44.00
A20	451-475	23.00	46.00
A21	476-500	24.00	48.00
A22	501-525	25.00	50.00
A23	526-550	26.00	52.00
A24	551-575	27.00	54.00
A25	576-600	28.00	56.00
A99	601-up	-- 1/	-- 2/

1/ Add $1.00 for each additional 25 page increment or portion thereof for 601 pages up

2/ Add $2.00 for each additional 25 page increment or portion thereof for 601 pages and more

Schedule E

EXCEPTION PRICE SCHEDULE

Paper Copy & Microfiche

Price Code	North American Price	Foreign Price
E01	$ 5.50	$ 11.50
E02	6.50	13.50
E03	8.50	17.50
E04	10.50	21.50
E05	12.50	25.50
E06	14.50	29.50
E07	16.50	33.50
E08	18.50	37.50
E09	20.50	41.50
E10	22.50	45.50
E11	24.50	49.50
E12	27.50	55.50
E13	30.50	61.50
E14	33.50	67.50
E15	36.50	73.50
E16	39.50	79.50
E17	42.50	85.50
E18	45.50	91.50
E19	50.50	100.50
E20	60.50	121.50
E99 - Write for quote		
N01	28.00	40.00

VOLUME 18 NUMBER 24/DECEMBER 23, 1980

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) 3225

02 AERODYNAMICS 3226

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

03 AIR TRANSPORTATION AND SAFETY 3231

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 3232

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 3232

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 3234

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER 3235

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 3236

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 3236

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*.

12 ASTRONAUTICS (GENERAL) 3237

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS 3240

Includes powered and free-flight trajectories, and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) 3240

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 3241

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 3242

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING 3242

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 3242

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION 3243
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER 3243
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 3245
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 3245
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 3249
Includes chemical analysis, e.g., chromatography, combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS 3252
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 3258
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 3259
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power*, *20 Spacecraft Propulsion and Power*, and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) 3263
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 3265
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 3272
Includes test equipment and maintainability, components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER 3276
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 3281
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*.
For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS 3282
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 3283
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 3285
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 3285
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) 3292

43 EARTH RESOURCES 3294
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION 3299
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION 3308
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 3314
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 3319
Includes weather forecasting and modification.

48 OCEANOGRAPHY 3323
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 3324
Includes genetics.

52 AEROSPACE MEDICINE 3328
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 3331
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 3332
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY 3333
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 3333
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 3337
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 3340
Includes computer networks.

63 CYBERNETICS 3340
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 3341
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 3345
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 3347
Includes mathematical modeling; network analysis, and operations research.

67 THEORETICAL MATHEMATICS 3347
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) 3347
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS 3347
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution*.

72 ATOMIC AND MOLECULAR PHYSICS 3349
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 3351
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation*.

74 OPTICS 3351
Includes light phenomena.

75 PLASMA PHYSICS 3354
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

76 SOLID-STATE PHYSICS 3354
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

77 THERMODYNAMICS AND STATISTICAL PHYSICS 3356
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) N.A.
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 3357
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 3357
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software*.

83 ECONOMICS AND COST ANALYSIS N.A.
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 3359
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 3359
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) 3360

89 ASTRONOMY 3360
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 3361
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 3362
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

92 SOLAR PHYSICS 3363
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 3364
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

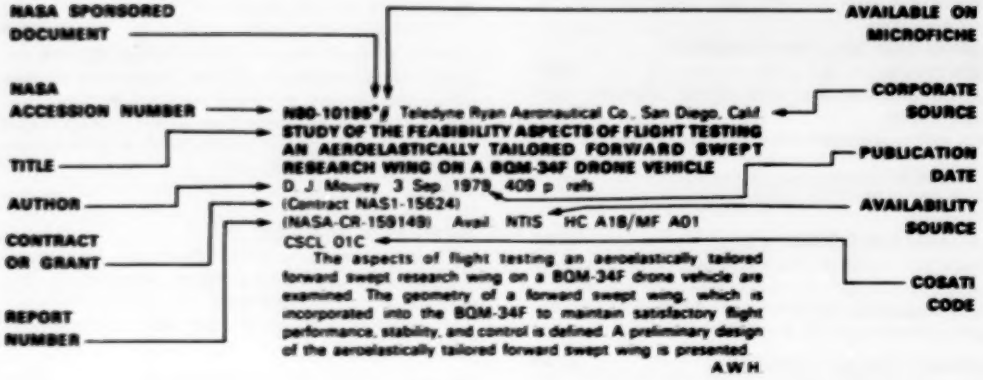
GENERAL

99 GENERAL 3365

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-59
CORPORATE SOURCE INDEX I-67
CONTRACT NUMBER INDEX I-81
REPORT/ACCESSION NUMBER INDEX I-83

TYPICAL CITATION AND ABSTRACT


NASA SPONSORED DOCUMENT
AVAILABLE ON MICROFICHE
NASA ACCESSION NUMBER
N80-10186*# Teledyne Ryan Aeronautical Co., San Diego, Calif.
CORPORATE SOURCE
TITLE
STUDY OF THE FEASIBILITY ASPECTS OF FLIGHT TESTING AN AEROELASTICALLY TAILORED FORWARD SWEPT RESEARCH WING ON A BQM-34F DRONE VEHICLE
PUBLICATION DATE
AUTHOR
D. J. Mourey 3 Sep 1979 409 p refs
(Contract NAS1-15624)
AVAILABILITY SOURCE
CONTRACT OR GRANT
(NASA-CR-159149) Avail: NTIS HC A18/MF A01
CSCL 01C
COSATI CODE
REPORT NUMBER
The aspects of flight testing an aeroelastically tailored forward swept research wing on a BQM-34F drone vehicle are examined. The geometry of a forward swept wing, which is incorporated into the BQM-34F to maintain satisfactory flight performance, stability, and control is defined. A preliminary design of the aeroelastically tailored forward swept wing is presented.
A.W.H.

ON-GOING RESEARCH PROJECTS

This is a listing of research projects - not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research and Support Facilities (air). For Related Information See Also Astronautics.

1.0001, CRASHWORTHY PASSENGER (MILITARY) SEAT
B. Mazelsky, A R A Co., *2017 W. Garvey Ave., West Covina, California* 91791 (DN081084; N62269-78-C-0251)

To develop a military passenger seat offering the safety, comfort, and protective features which 'state-of-the-art' crashworthy seat technology has to offer. This contract supports work unit ZA601, Agency Accession No. DN 681080.

Development will involve three tasks: Task 1 will comprise the design phase; Task 2 will include the fabrication of prototypes and the static and dynamic test and evaluation phase; Task 3 will evaluate advanced prototypes under dynamic crash simulation tests.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

1.0002, THE FEASIBILITY OF THRUST MEASUREMENT DURING FLIGHT
T.W. Carpenter, California State University & Colleges, California Polytechnic State University, School of Engineering & Technology, Dept. of Aeronautical Engineering, *San Luis Obispo, California* 93407 (NAG 4-4)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Hugh L. Dryden Flight Research Center

1.0003, INVESTIGATION OF FACTORS CAUSING FUEL LEAKS AT STRUCTURAL FASTENERS
J.W. Mahoney, Rockwell International Corp., *International Airport, Los Angeles, California* (DF143870; F33615-79-C-3216)

This work unit supports the requirement for enhanced fuel tightness in integral fuel tanks for USAF aircraft. Mil-A-8867B is directly supported in the area of fuel tank leak testing and Mil-T-5578 in the area of fuel tank sealing. This effort is directed toward solving the problems of fuel leakage at structural fasteners. The objective of this program is to investigate factors which cause fuel leaks at structural fasteners. The reduction of fuel leak problems will significantly reduce the maintenance costs of USAF aircraft.

This effort will select various structural fastener systems and evaluate their fuel sealing capability. Representative integral fuel tank structure will be fabricated using the selected fastener systems. The structure will be tested under pressure while being subjected to flight-by-flight loading. Recommendations will be made to use the most qualified fasteners in future designs.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0004, A STUDY OF THE USE OF MULTIGRID TECHNIQUES ON THE RELAXATION OF STEADY TRANSONIC FLOWS
D. Baganoff, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (NCA 2-745005)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

1.0005, STANFORD/AMES JOINT INSTITUTE FOR AERONAUTICS AND ACOUSTICS (AERODYNAMIC STUDIES RELATING TO SHORT-HAUL AIRCRAFT)
K. Karamcheti, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (NCC 2-74)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

1.0006, STANFORD/AMES JOINT INSTITUTE FOR AERONAUTICS AND ACOUSTICS (FLIGHT EFFECTS ON JET NOISE)
K. Karamcheti, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (NCC 2-75)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

1.0007, JOINT INSTITUTE FOR AERONAUTICS AND ACOUSTICS - STUDIES OF THE EFFECTS OF HOW FIELDS ON NOISE DIRECTIONALITY
K. Karamcheti, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (NCC 2-76)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

1.0008, BOUNDARY LAYERS AND WAKES OF OSCILLATING AIRFOILS AT SUBSONIC AND TRANSONIC SPEEDS
K. Karamcheti, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (NCC 2-77)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

1.0009, DEVELOPMENT OF FLIGHT CONTROL SYSTEMS/FLYING QUALITIES CRITERIA FOR LIFT/CRUISE FAN V/STOL AIRCRAFT
D. McRuer, Systems Technology Inc., *13766 S. Hawthorne Blvd., Hawthorne, California* 90250 (DN881486; N62269-78-C-0129)

To establish baseline flying qualities requirements for flight control laws, flight path critical displays and control/propulsion integration concepts for a Navy lift/cruise fan aircraft. Supports work unit DH820, Agency Accession No. DN881124.

Investigations will be conducted to define flight control requirements for a lift/cruise fan vehicle. Flying qualities criteria will be established for the design of a flight control/display

system suitable for all modes of flight, including hover maneuvering, transition maneuvering, cruise maneuvering, take-off and landing. The flight control development will address integrated propulsive and aerodynamic control concepts, failure mode effects, pilot station controls and displays, actuation concepts and system reliability. The ability of the flight control/display system to provide satisfactory flying qualities will be demonstrated through piloted simulation at the NASA Ames Research Center.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

1.0010, GRADUATE STUDENT RESEARCHERS PROGRAM

R.L. Fearn, State University System of Florida, University of Florida, School of Engineering, Dept. of Aerospace Engineering, *220 Black Hall, Gainesville, Florida* 32611 (NGT 10-005-801)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0011, HELICOPTER ROTOR LOADS USING A MATCHED ASYMPTOTIC EXPANSION TECHNIQUE STUDY

G.A. Pierce, Georgia Inst. of Technology, School of Engineering, Dept. of Aerospace Engineering, *225 North Ave. N.W., Atlanta, Georgia* 30332 (NAS 1-16222)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0012, DESIGN CRITERIA FOR A SUPERSONIC SMOKE TUNNEL

Unknown, University of Notre Dame, Graduate School, *Notre Dame, Indiana* 46556 (DF144510; F33615-79-C-3034)

The severity and complexity of the effect of the aerodynamic environment on military vehicles increase as more stringent performance requirements are demanded. Consequently, new materials and configurations must be developed to negate the effect of the new requirements. Aerodynamic test facilities must be continually developed to provide the environment in which the performance of these new materials and configurations can be verified in a cost-effective, timely manner. This program is to develop design criteria for a three-dimensional, supersonic smoke tunnel to operate at about Mach 1.5 with a two-foot square test section. The tunnel shall provide accommodation for both smoke and schlieren photography. A generator to produce a safe, non-toxic and non-explosive, smoke shall be included.

The contractor shall develop aerodynamic and structural design criteria for the supersonic smoke tunnel and its accessories and provide an analysis of the construction and procurement costs.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0013, EFFECTS OF FRAGMENTS/PROJECTILES ON MISSION CRITICAL AIRCRAFT COMPONENTS

B.T. Bentley, U.S. Dept. of Defense, Army, Armament Research & Development Command, Vulnerability Lethality Div., *Aberdeen Proving Ground, Maryland* 21005 (DA0P4485)

To strengthen the methodology and data base for quantification of mission kill and mission available categories of aircraft and helicopter vulnerability.

Identify mission essential components and apply covert methodology.

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Ballistic Research Lab.

1.0014, SELECTED APPLICATIONS OF COMPUTATIONAL AERODYNAMICS

J.D. Anderson, University of Maryland, College Park Campus, School of Engineering, Dept. of Aerospace Engineering, *College Park, Maryland* 20742 (NCC 1-41)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0015, DEVELOP NOISE-CHECK TECHNOLOGY FOR MONITORING AIRCRAFT NOISE

P. Rentz, Bolt Beranek & Newman Inc., *50 Moulton St., Cambridge, Massachusetts* 02138 (DF322710; F33615-77-C-0514)

A vital part of Air Force environmental noise planning efforts is the need to perform spot-check noise measurements which provide data supporting predicted noise exposure values and the corresponding decisions made regarding land use compatibility and environmental noise impact. The objective of this contract is to develop the aircraft noise monitoring technology needed by Air Force personnel to collect field-measured noise exposure data acceptable as evidence in cases involving extreme controversy or litigation.

The contractor will review the present state-of-the-art in aircraft noise monitoring technology. He will develop specific procedures and instrumentation requirements for use by Air Force personnel in collecting noise exposure data able to withstand the closest technical scrutiny. The contractor will demonstrate the adequacy of the proposed AF noise-check methodology by performing an actual field application study at an AF airbase. Refinements in noise-check will be made after analysis of the data from the field application study.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

1.0016, UNSTEADY TRANSONIC AERODYNAMICS RESEARCH

L. Morino, Boston University, School of Engineering, Dept. of Aerospace Engineering, *755 Commonwealth Ave., Boston, Massachusetts* 02215 (NGT 22-004-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0017, UNSTEADY TRANSONIC AERODYNAMICS RESEARCH

L. Morino, Boston University, School of Engineering, Dept. of Aerospace Engineering, *755 Commonwealth Ave., Boston, Massachusetts* 02215 (NGT 22-004-801)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0018, GRADUATE STUDENT RESEARCHERS PROGRAM

L. Morino, Boston University, School of Engineering, Dept. of Aerospace Engineering, *755 Commonwealth Ave., Boston, Massachusetts* 02215 (NGT 22-004-802)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0019, HELMET-MOUNTED OCULOMETER DEVELOPMENT

J. Merchant, Honeywell Inc., Radiation Center, *2 Forbes Rd., Lexington, Massachusetts* 02173 (DF142950; F33615-77-C-2077)

The mission this work unit supports is the simulation of advanced aerospace vehicles. The engineering flight simulator is a modern tool for the analysis and evaluation of current and future Air Force systems. The opportunity exists with simulations to develop proposed flight control system schemes, including cockpit controls and displays. This requires man-in-the-loop participation throughout the design evaluation. The objective of this work unit is to develop, install, demonstrate and maintain a system capable of both head and eye measurements of the test subject without any attachments to the subject and within the framework of moving base simulation. This program contributes to effective simulation of flight vehicles.

Studies will be conducted to establish the optimum location for equipment to be installed. The equipment will then be engineered to be compatible with installation requirements. All power and signal cables will be installed and the equipment will be installed and demonstrated. The demonstration will consist of 3 hours reliable data acquisition daily for a period of two weeks with no more than 30 minutes down-time per eight-hour shifts.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0020, DEVELOPMENT AND USE OF GENERALIZED INTERNAL COMBUSTION ENGINE CYCLE SIMULATIONS

J.B. Haywood, Massachusetts Inst. of Technology, School of Engineering, Dept. of Mechanical Engineering, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (NAG 3-82)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

1.0021, DIGITAL FLIGHT CONTROL SOFTWARE VALIDATION/VERIFICATION METHODOLOGY DEVELOPMENT

E.R. Rang, Honeywell Inc., *2600 Ridgeway Pkwy. N.E., Minneapolis, Minnesota* 55413 (DF141450; F33615-78-C-3605)

The program is in support of future advanced digital flight control systems of aerospace vehicles. Future flight control systems will be digital and to date no economical, highly effective means exists for proving the correctness of the associated software. Presently, extensive testing and simulation have been used to ensure correctness of the system software design, which is expensive and inadequate for complex systems. This program is intended to provide analytical and automatic techniques to validate software design in the design phase of the development cycle of modern flight control systems. A study of existing validation techniques will be made and the most promising adapted to the design of flight control system software. The result will be a design methodology to validate flight control system software at each phase of the development cycle.

An investigation will be conducted into various software development and checkout methodologies to determine applicability to redundant flight control system software design. A disciplined software validation approach will be defined that incorporates the advantages of the investigated technologies. A methodology will be developed that aids in the design and employs as much automation as possible so as to make maximum use of the thoroughness of computerized checkout.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0022, AEROSPACE ENGINEERING SYMPOSIUM FOR HIGH SCHOOL STUDENTS

M. Gant, New Jersey Inst. of Technology, Graduate School, *323 High St., Newark, New Jersey* 07102 (NAS 5-26156)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

1.0023, COANDA/REFRACTION EXHAUST NOISE SUPPRESSOR FOR AIRCRAFT HUSH-HOUSES

D. Croce, U.S. Dept. of Defense, Navy, Naval Air Engineering Center, *Lakehurst, New Jersey* 08733 (DN896013)

To develop the COANDA/refraction noise suppression concept with specific application to aircraft hush-house exhaust systems. To define a functional configuration for use with all Navy/Marine Corps aircraft.

Conduct an investigative program consisting of breadboard scale-model tests with simulated engine sources, analytic studies and configuration analysis studies. Conduct aero/thermodynamics and acoustic analyses of tests performed with model flat-plate ejectors.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

1.0024, DEVELOPMENT OF A COMPREHENSIVE RDT/E PROGRAM FOR GROUND SUPPORT EQUIPMENT

M. Palamar, U.S. Dept. of Defense, Navy, Naval Air Engineering Center, *Lakehurst, New Jersey* 08733 (DN133406)

To develop a systematized RDT/E program which will define and integrate future ground support requirements with a comprehensive RDT/E effort insuring an optimal operational support capability for future generation aircraft and weapons systems.

Develop a detailed identification of the testing, servicing, maintenance, and handling functions necessary to support aircraft and associated directives, along with organizational structure for the planning and managing of GSE RDT/E. Develop and implement systematic measures to insure prompt consideration of ground support equipment requirements which may be introduced by advancements in airborne systems, changes in support technology, or changes in the operational environment. Develop a long range plan for GSE RDT/E to parallel aircraft systems and technology forecasts.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0025, AIRBORNE SIMULATION AND RESEARCH INVESTIGATIONS

P.A. Reynolds, Calspan Corp., *1422 Genesses Ave., P.O. Box 235, Buffalo, New York* 14221 (DF142120; F33615-78-C-3602)

Engineering simulation is a cost-effective design tool for supporting advanced weapon systems development. In-flight simulation using variable stability airplanes provides the advantages of actual flight, visual, and motion cues in evaluating design trade-offs. The NT-33 and NC-131H variable stability airplanes will be used to conduct research programs to investigate flight control system problems and the integration of other subsystems with flight control. The systematic integration of the control function with other weapon systems functions such as fire control and control displays will result in new airplanes which can provide greater flexibility and mission effectiveness.

The NT33A and the TIFS NC-131H variable stability aircraft will be used to look at riding and flying qualities, simulated control systems, actual displays, cockpit controllers, actual control system hardware and the interaction between these factors and other airplane subsystems. Flight training will also be included for pre-first flights of new aircraft as well as test pilot school indoctrinations. Details of each investigation or training program will be outlined at a planning meeting between the contractor, AF Flight Dynamics Laboratory and the requiring agency personnel prior to each investigation. These details will be documented by a test plan prior to flight testing.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0026, FORMULATION OF STOL CONFIGURATIONS

Unknown, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DF143360; F33615-79-C-3007)

The Air Force function for this effort is to investigate advanced STOL configurations. STOL configurations represent an opportunity for a solution to the runway denial problem which has high Air Force interest. The objective of this effort is to develop advanced conceptual fighter designs that incorporate STOL configurations and other advanced technologies. The contribution of advanced STOL configurations is short take-off and landing from damaged runways or even highways, enhanced maneuvering performance, improved survivability, and improved target kill capability.

Parametric trade-off studies will be conducted for each STOL configuration to define the baseline configuration geometries and optimize gross take-off weights. Based on the trade-off studies and technology expected to be available between 1982 and 1985, six baseline STOL configurations will be developed, including two configurations using vectored engine-over-wing propulsive lift. A performance analysis will be conducted for each STOL configuration and a comparison of advantages/disadvantages of the STOL configuration for each application will be made. The most promising STOL configuration for each ap-

plication will be determined and the performance and operational benefits of STOL configurations will be identified.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0027, WEAPON CARRIAGE AND SEPARATION TECHNOLOGY

R.L. Clark, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF144800)

The Air Force function for this effort is to investigate advanced weapon/airframe integration for future high performance systems. External carriage of weapons by supersonic aircraft generally degrades their performance severely while internal carriage increases the weight and volume of such aircraft. The objective of this effort is to develop and experimentally evaluate advanced carriage concepts which will minimize the performance, weight, and volumetric penalties associated with advanced external and/or internal weapons carriage. Emphasis on reducing the detectability of penetrating aircraft will result in carefully integrated external or internal weapon carriage concepts. These designs may have unique weapon separation characteristics, and these will be investigated during this effort. Improved analysis methods for predicting weapon/airframe interference and weapon separation characteristics will be evaluated when available. Expected benefits of the effort include improved penetration capability and improved supersonic weapon carriage.

This effort will utilize the results of previous in-house and contracted research to define advanced integrated external and/or internal carriage configurations for analysis and experimental investigation. Flight test data on a modified F-111 internal weapons bay are expected to become available for correlation with previously acquired wind tunnel data. The implementation and documentation of the 'technique for predicting aircraft aerodynamic effects due to external stores carriage' will also be completed under this effort. Advanced analysis methods for predicting weapon/airframe interference and weapon separation characteristics will be applied and results compared with results from existing prediction methods and/or experimental data.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0028, OPTIMAL DATA PROCESSING AND FAILURE DETECTION FOR AUTOMATIC FLIGHT CONTROL OF ADVANCED USAF AIRCRAFT

A.P. Dethomas, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF128400)

A high degree of reliability in control data instrumentation is vital to the mission of USAF aircraft, and this objective is typically accomplished by comparing the outputs of redundant system components. However, the penalty in weight and volume of such equipment redundancy can be substantial. Data systems already onboard an aircraft provide functionally related data and this form of redundancy can be exploited rather than resorting to duplication of entire data systems. The objective of this work is to develop practical Kalman filters to combine the information of individual data systems and to use these filters to detect component failures and to replace failed signals, thereby providing failure tolerance.

Beginning with the ABRES vehicles, recognizable future Air Force flight vehicles will be studied and analyzed to identify particular structural areas and components which need and/or may benefit from efficient application of beryllium. Hybrid configurations as well as all beryllium construction will be considered to insure practical consideration of efficient/economical applications of this specialty material. The results of such investigations will be used to provide guidance in the selection of hardware demonstration components necessary to exhibit structural concept feasibility, close technical gaps and establish confidence in the structural adequacy of beryllium.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0029, SIMULATION VERIFICATION

W.W. Harrington, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF141680)

This work unit supports the development and maintenance of analysis capabilities, engineering simulation capabilities, and experimental testing methods for flight/man-machine system evaluation. It is directed toward the development of basic simulation technology as required by manned engineering flight simulation for fighter aircraft development. Specific objectives include: 1) verification of a specific aircraft model, including airframe stability and thrust versus drag, 2) verification of the real-time simulation of this aircraft model, 3) development of parameter identification techniques as verification tools, 4) development of data reduction techniques and software for the evaluation of the utility and adequacy of simulator cues for the air-to-air combat environment, and 5) evaluation of the adequacy of simulator cues as provided by the large amplitude multimode aerospace research simulator (LAMARS) at the AFFDL for the air-to-air combat environment. The adequacy of simulator cues for the air-to-air combat environment as provided by the dual flight simulator (DFS) in the Federal Republic of Germany will also be evaluated. This analysis will contribute to the technology required for the appropriate development, adaptation, and integration of simulation equipment in support of AFFDL manned engineering flight simulation programs.

Flight test and simulation data will be obtained from a flight test/simulation program containing five interrelated phases, including vehicle performance testing, conventional stability testing, parameter identification testing, handling qualities during tracking testing, and Terminary air-to-air gunnery testing with an LCOSS sight. Both subjective and quantitative data will be evaluated. The data reduction techniques and software will be develcped as part of this effort. The analysis will be applied to data from the LAMARS and also to data from the DFS, which will be provided under MWDDEA AF 75 G 7430.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0030, MULTI-MICROPROCESSOR CONTROL ELEMENTS

J.E. May, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF142560)

This program seeks to apply multiple microprocessors to aircraft digital flight control systems. State-of-the-art digital flight control systems are tailored to a general purpose digital computer architecture. This program will apply multiple microprocessors to mechanize a flight control system specifically tailored to flight control requirements. It is anticipated that this program will improve reliability of flight critical control systems and reduce control system hardware and software costs.

Evaluation modules will be breadboarded and candidate microprocessors and supporting hardware will be evaluated in the AFFDL/FGL Development Laboratory. A candidate microprocessor type will be selected as the basic unit for a flight control system design. Based upon the selected microprocessor type, a prototype modularized distributed microprocessor flight control system will be designed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0031, ADVANCED DIGITAL CONTROL TECHNIQUES

J.W. McDowell, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF140210)

The Transport Advanced Control Synthesis Program will investigate applications of modern control techniques to aircraft flight control systems. The objective of this effort is the derivation and implementation of improved flight control laws via restructurable digital systems, thus providing the opportunity for enhanced pilot/crew management of aircraft guidance, navigation and control systems. Performance improvements will be demonstrated which can be applied to military missions of cargo/weapon delivery and aircraft rendez-vous. In addition, applied modern control techniques offer the capability for mini-

mization of the effects of atmospheric disturbances, such as wind shear.

Design, fabricate, and flight test-validate a digital flight guidance system. Develop the in-house capability to restructure the software and implement flight control laws based upon modern control techniques. Collect flight test data comparing performance of the new control laws. Define applications to future aircraft flight control systems.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0032, DIGITAL DATCOM COMPUTER PROGRAM FOR AIRCRAFT STABILITY AND CONTROL

B.F. Niehaus, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF132910)

This work unit supports TPO 3, Flight Control and Major Thrust, and FGO2B, Flight Control System Design Techniques. Rapid and inexpensive methods for predicting the aerodynamic stability and control characteristics of Air Force weapon systems are needed. The objective of this work unit is to provide improvements in the digital DATCOM computer program, which is an automated stability and control prediction tool. At its current stage of development, it is an efficient computer tool; however, improvements are needed to reduce the engineering time required to prepare input and to interpret output. The availability of these methods will lead to better aircraft designs by permitting rational trade-offs to be considered early in the design.

Digital DATCOM data will be applied to various types of problems, e.g., preliminary design, correcting wind-tunnel data to obtain the effects of configuration changes, etc. The experience gained will help identify weaknesses in the digital DATCOM program. Particular emphasis will be placed on the evaluation of the input requirements and output suited to specialized tasks, as well as method accuracy and range of applicability.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0033, COMBINED ENVIRONMENTS RELIABILITY TEST

H.E. Reynolds, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF136650)

Repair costs of Air Force aircraft electronics equipment attributable to environmentally induced failures have been found to be approximately 460 million dollars per year. Equipments typically fail in service six-to-eight times more often than expected from laboratory demonstrations. The objective of this effort is to develop a realistic but cost-effective combined environments test that could be used for both qualification and reliability test and evaluation. The use of this test in the development and acquisition of electronics equipment should significantly improve its field reliability and correlation between field and laboratory reliability.

Realistic assessment and prediction of actual environmental conditions that equipment is subjected to in field service will be determined through acquisition and analysis of aircraft environmental data. Realistic combined environment profiles will be developed for evaluation and test of aircraft equipment for various classes of aircraft. Capability to 'fly the equipment in the laboratory' will be developed by combined environment testing under realistic temperature, airflow, humidity, altitude, and random vibration conditions representative of aircraft equipment installations. New testing standards will be generated to provide the tests required to increase the effectiveness of testing needed to assure that only reliable hardware is introduced into service.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0034, LOADS FACILITY EVALUATION

T.F. Sabick, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF143810)

There is currently no facility in the free world in which the survivability of aircraft structures can be evaluated in a realistic flight-loaded condition and subjected to actual ballistic impacts. This testing is necessary to determine the structural degradation of ballistically damaged aircraft components. The objective of this effort is to provide the on-site support necessary for the installation and initial evaluation of a flight load simulation system in the aircraft survivability research facility. The data produced in this effort will be used to improve the battle-damaged structure analysis code and thereby improve survivability design studies and vulnerability assessments.

The load reaction frame and associated instrumentation and control components that comprise the flight loads simulation system will be installed in the ASRF. Evaluation and check-out will be performed utilizing replica wing specimens. Of the five replica specimens that will be used, three will have structural members removed to simulate ballistic damage. When this initial evaluation stage is complete, an actual A-10 aircraft wing will be installed and tested using a typical foreign anti-aircraft round as the threat. A detailed comparison between the battle-damaged structure analysis code prediction and the actual wing response will then be performed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0035, NUMERICAL SIMULATION OF HEAT TRANSFER PHENOMENA OCCURRING DURING DEICING OF AIRCRAFT COMPONENTS

K.J. DeWitt, University of Toledo, School of Engineering, Dept. of Chemical Engineering, *2801 W. Bancroft St., Toledo, Ohio* 43606 (NAG 3-72)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

1.0036, INVESTIGATIONS OF FLOW FIELDS FOUND IN TYPICAL COMBUSTOR GEOMETRIES

D.G. Lilley, Oklahoma State University, School of Engineering, Dept. of Mechanical & Aerospace Engineering, *Engineering N., Stillwater, Oklahoma* 74074 (NAG 3-74)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

1.0037, GRADUATE STUDENT RESEARCHERS PROGRAM

T.W. Doeppner, Brown University, Graduate School, Dept. of Applied Mathematics, *University Hall, Box 1883, Providence, Rhode Island* 02912 (NGT 40-002-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0038, FREESTREAM AERODYNAMICS

V.S. Oxford, U.S. Dept. of Defense, Air Force, Arnold Engineering Development Center, *Arnold Air Force Station, Tullahoma, Tennessee* 37389 (DF641560)

Air Force function - aircraft-STORES compatibility. Opportunity -structural integrity and certification of STORES on aircraft. Goal - to provide STORES-free-stream aerodynamic data in graphical, tabular, and magnetic tape form. How work contributes - allows for a quick and efficient means of obtaining data for use with MIL-A-8591E and for comparisons with STORES in carriage.

The approach will be to first compile the existing available STORES-free-stream aerodynamic data, and then develop a data retrieval system which allows for access to the data through tabular, graphical or magnetic tape form. The system will be updated to include new data as they become available.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Armament Lab.

1.0039, STUDIES OF ADVANCED WING CONFIGURATIONS
H.L. Chevalier, Texas A & M University, College Station Campus, School of Engineering, Dept. of Aerospace Engineering, *P.O. Box F E 44, College Station, Texas* 77843 (NCC 2-78)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

1.0040, DEVELOPMENT OF A FLIGHT TEXT DATA-HANDLING PROGRAM FOR A COMPOSITE AIRCRAFT
W.T. Fowler, University of Texas, Austin Campus, School of Engineering, Dept. of Aerospace Engineering & Engineering Mechanics, *200 W. 21st, Austin, Texas* 78712

DESCRIPTION: In 1977, the first FAA-certified all-composite aircraft was donated to the Aerospace Engineering and Engineering Mechanics Department of The University of Texas at Austin. Several flight research programs are being developed with this aircraft, including an investigation of a mechanism of noise transfer into a composite aircraft cabin environment and an investigation of the influence of winglets on light aircraft performance. On-board digital data acquisition and recording systems are being developed for these programs. The study, in its second year, initiates a general aviation research program within the Department.

SUPPORTED BY University of Texas

1.0041, AERODYNAMICS OF BALLISTICALLY DAMAGED ROTOR BLADES (HT 79-15)
D. Hollenbaugh, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Applied Technology Lab., *Fort Eustis, Newport News, Virginia* 23604 (DA0E3862)

To establish a realistic data base in the area of ballistically damaged rotor airfoil sectional aerodynamic forces in order to develop a better understanding of the effect of aerodynamic changes due to ballistic damage on helicopter performance.

Wind tunnel tests will be conducted on both standard metal and experimental composite material rotor blade sections. Two sets of tests will be run. The first will be use sections with mechanically simulated damage to isolate the parametric effects of hole size, chordwise location, and peelback area. The second will use specimens damaged by 23mm HEI rounds for exact realistic correlation. Tests shall be conducted over a range of Mach numbers and angles of attack to simulate spanwise position and flight condition.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

1.0042, COMPUTATIONAL STUDY OF LEADING EDGE VORTEX FLAPS - GRADUATE STUDENT RESEARCHERS PROGRAM
J.F. Marchman, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Aerospace & Ocean Engineering, *Blacksburg, Virginia* 24061 (NGT 47-004-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, A PRELIMINARY STUDY OF A CRYOGENIC EQUIVALENCE PRINCIPLE EXPERIMENT ON SHUTTLE
C.W. Everitt, Stanford University, W.W. Hansen Lab. for Physics, *Stanford, California* 94305 (NAS 8-33796)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

2.0002, DESIGN COMPUTERIZED MODEL SHUTTLE FLIGHTS
J. Wilson, University of Texas, Austin Campus, School of Engineering, Dept. of Materials Science & Engineering, *200 W. 21st, Austin, Texas* 78712 (NAS 9-16124)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, GRADUATE STUDENT RESEARCHERS PROGRAM
C.B. Moore, Arizona State University, School of Liberal Arts, Dept. of Chemistry/Geology, *Tempe, Arizona* 85281 (NGT 03-001-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

3.0002, CRYSTAL CHEMISTRY
M. O'Keeffe, Arizona State University, School of Liberal Arts, Dept. of Chemistry, *Tempe, Arizona* 85281 (DMR78-09197)

The ultimate goal of this project is to obtain an improved understanding of structure and bonding in inorganic solids. General structural and bonding principles are sought that will (a) enable one to rationalize and organize the enormous body of structural data already extant; (b) serve as guides to predicting the existence, structure, and properties of new inorganic solids; and (c) help to integrate the chemistry of solids with the rest of inorganic chemistry. A major intermediate goal is obtaining a better understanding of the importance of cation-cation nonbonded interactions in determining crystal structure and stability. The program includes synthesis and structure determination of oxides and nitrides of beryllium, silicon, aluminum, gallium, and phosphorus. Included are ceramics of silicon, aluminum, oxygen and nitrogen (the 'sialon' refractories) that are important in high temperature and solar energy applications. The occurrences of extended defects and ordered intermediate phases also are being explored in order to gain a fuller understanding of the structure, stability, and reactivity of these compounds.

Disorder in crystals is investigated with emphasis on sublattice melting. Finally, means of simplifying the descriptions of complicated crystal structures are being sought.

This is a continuation of work supported under DMR 72-03246. This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

3.0003, A STUDY OF THE PHYSICAL PROPERTIES OF COMPOSITES
F. Holmstrom, California State University & Colleges, San Jose State University, School of Science, Dept. of Physics, *Washington Sq., San Jose, California* 95192 (NCC 2-80)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

3.0004, SYNTHESIS, CHARACTERIZATION, AND FORMULATION OF PERFLUOROCARBON EITHER ELASTOMERS
G.A. Selter, California State University & Colleges, San Jose State University, School of Science, Dept. of Chemistry, *Washington Sq., San Jose, California* 95192 (NCC 2-81)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

3.0005, GRADUATE STUDENT RESEARCHERS PROGRAM
R. Jaffe, Stanford University, School of Humanities & Sciences, Dept. of Chemistry, *Stanford, California* 94305 (NGT 05-020-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

3.0006, CREEP BEHAVIOR UNDER VERY LOW STRESSES
F.A. Mohamed, University of Southern California, School of Engineering, Dept. of Mechanical Engineering & Materials Science, *3551 University Ave., Los Angeles, California* 90007 (DMR80-05976)

Experimental evidence indicates the occurrence of two Newtonian processes, Nabarro-Herring creep and Harper-Dorn creep, at very low stresses and at temperatures near the melting point. The creep strain of the Nabarro-Herring process is produced by vacancy transport, and the steady-state creep rate, which is governed by lattice diffusion, is dependent on the grain size of the material. In contrast, the creep strain ascribable to Harper-Dorn creep is produced by some form of dislocation activity in the grain interior, and the creep rate is therefore insensitive to changes in grain size. The objectives of this program are to (1) consolidate the present substructural results on Harper-Dorn creep in aluminum and its alloys, (2) investigate the relationship between the Harper-Dorn process and Nabarro-Herring creep, (3) study the effect of the stacking fault energy on the normalized creep rates of the Harper-Dorn process, and (4) examine Harper-Dorn creep as a general process of deformation. This is a continuation of research, previously funded under NSF Grant DMR77-27619. This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

3.0007, FATIGUE OF TITANIUM ALLOYS
A.J. McEvily, University of Connecticut, Storrs Campus, School of Engineering, Dept. of Metallurgy, *Box U-37, Storrs, Connecticut* 06268 (DF053740; F49620-79-C-0004)

AF function - resistance to damage due to fatigue processes is necessary to achieve the desired durability of airframe and engine structures. Opportunity - the AFML-MOU, along with the French, has provided a unique condition to study the fatigue behavior of titanium alloys. Objective - to establish the principal mechanisms of fatigue damage in titanium alloys and the influence of processing variables on this damage. How work contributes - results will directly aid in the development of structural materials for future AF applications.

Two titanium alloys (Ti-5524S and Ti-685) will be experimentally examined under elevated temperature fatigue conditions. Characterizations of fatigue damage will be accomplished according to alloys, processing variables and fatigue environment parameters. Experiments will be conducted at room temperature and 540 degrees C and at 0.3 and 0.04Hz. Failure surfaces will be examined by microscopy techniques to correlate micro/macro observations. In addition, the effects of overload on the fatigue resistance will be studied in terms of work retardation and the above-mentioned characterization parameters.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0008, HIGH DOSE ION IMPLANTATION OF ALUMINUM AND TITANIUM ALLOYS
J.R. Stevenson, Georgia Inst. of Technology, School of Physics, *225 North Ave. N.W., Atlanta, Georgia* 30332 (DF054110; AFOSR-79-0011)

AF function - corrosion due to the formation of oxides and nitrides limits the life-span of equipment and is both economically and militarily expensive. Deficiency - unexpected and catastrophic failure of metal components can occur where corrosion damage is undetected. Objective - to make beneficial changes to the surface chemical and physical properties by the use of ion implantation techniques. How work contributes - ion implantation is expected to improve such surface properties as hardness, friction and resistance to oxidation and corrosion without changing the bulk properties of structural metal alloys.

Ion implantation is a technique which has evolved from electronic device fabrication. This research project will explore the possibilities of improving the mechanical, chemical and metallurgical surface properties by utilizing high doses (up to 10 to the 19th ions incident per sq. cm of target area).

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0009, INITIATION, COMBUSTION AND TRANSITION TO DETONATION IN HOMOGENEOUS AND HETEROGENEOUS REACTIVE MIXTURES
R.A. Strehlow, University of Illinois, Urbana Champaign Campus, School of Engineering, Dept. of Aeronautical & Astronautical Engineering, *207 Engineering Hall, Urbana, Illinois* 61801 (DF049180; AFOSR-77-3336)

AF function - advanced chemical explosive weapons, weapon delivery with the MX missile using high energy HMS propellants, missile and aircraft component vulnerability and survivability. Deficiency -insufficient understanding of basic mechanisms of chemical initiation, propagation, attenuation and quenching of blast waves and detonations in reactive media, e.g., single event FAE III. Unscheduled transition to detonation in Navy C-4 missiles using similar propellants planned for MX missiles. Objective - to obtain better understanding and realistic model basic mechanisms of triggering detonations in fuel-air clouds by use of chemical accelerants, and nonlinear initiation of detonation by finite amplitude waves in an incipiently reactive system; to develop general but accurate criteria describing the possibility of deflagration-to-detonation transition (DDT) in beds of granulated high energy propellants and explosives, and to assess possible DDT hazard of missile propellants. How work contributes - will provide (1) additional understanding of basic processes of chemical initiation of detonations, transition from deflagration to detonation (DDT), attenuation of flame, blast and detonation waves, (2) quantitative models a priori predicting properties, blast initiation requirements and damage potential of FAE clouds and DDT transition in granular propellants and explosives, (3) guidelines for evaluation and design of single event FAE III explosive devices, effective flame and detonation arrestors, and safe, high performance propellants in missile weapon systems.

The influence of local concentrations of reactive chemical promoters (accelerators) on initiation and transition to detonation of reacting clouds will be studied theoretically and numerically using an existing Lagrangian time-dependent finite difference program (CLOUD) modified to include Arrhenius-type kinetics in the CLOUD and accelerated kinetics in the region containing the accelerant. Concurrently, nonlinear 2-D effects leading to direct detonation of fuel-air mixtures by large scale eddy flame folding and for acceleration processes will be studied. Optimum ratios of vapor cloud size to promoter spot size and optimum internal promoter concentration gradients will be determined which promote transition from adiabatic explosion to detonation. Concerning the research in granulated propellants, theoretical calculations will be carried out. (Text Abridged)

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0010, RESPONSE OF HEATED MATERIALS TO SHOCK LOADING (X-RAY SHOCK)
G.E. Hauver, U.S. Dept. of Defense, Army, Armament Research & Development Command, Terminal Ballistic Div., *Aberdeen Proving Ground, Maryland* 21005 (DA0J4541)

The objective is to investigate the response of heated aerospace materials to shock loading. Materials subjected to a radiation environment can be heated to a significant depth below the exposed surface. The shock response and subsequent failure of these heated materials are concerns in the evaluation of fratricide and lethality.

The analytical approach will treat shock propagation in one-dimensional specimens of an ablator material, an aluminum alloy, and an epoxy-bonded system consisting of the two materi-

als. The analysis of shock propagation in systems containing heated and unheated aluminum will be performed. An attempt will be made to develop a fracture and spall model which is temperature-dependent for the aluminum alloy. Gas gun experiments on the individual materials and the bonded system will provide input to the analytical treatment and also assess the accuracy with which the analytical treatment predicts physical behavior. It is planned to perform uniaxial strain experiments at stress levels up to 10 kbar to investigate the Hugoniot and unloading characteristics of the ablator, as well as attenuation and dispersion effects. The dynamic yield stress of the aluminum alloy will be measured as a function of temperature. The characteristics of reflected and transmitted stress pulses in the bonded system will be investigated for comparison with computed pulses.

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Ballistic Research Lab.

3.0011, WEAPONRY - PROCESSES AFFECTING COMBUSTION OF SOLID PROPELLANTS

L. Caveny, Princeton University, School of Engineering & Applied Sciences, Dept. of Aerospace & Mechanical Sciences, *Box 430, Princeton, New Jersey* 08540 (DN623049; N00014-75-C-0705)

The Navy missile arsenal contains a wide variety of solid propellant rockets, and it is the objective of this task to advance the understanding of performance behavior of solid propellants, and thereby lay the scientific groundwork for solid propellant rocket developments of the future. The main emphasis here is on solid propellant combustion embracing the description and incorporation into theoretical scheme all processes, physical and chemical, which occur during the burning of a solid propellant. The fundamental studies of this task form the bases for selection of propellant ingredients and physical design of the solid propellant grain which may be used in Navy ordnance rockets, as well as in solid propellant rockets for any application.

The pressure dependence of the burning rate of mono- and composite propellants will be studied, emphasizing the kinetics of decomposition and the rates of reaction of the decomposition products. These rate data will be used in models of the burning process that include reaction, momentum, energy, and mass transfer rates.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0012, DEVELOPMENT OF FATIGUE-RESISTANT TITANIUM ALLOYS

J. Kennedy, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN890142; N00019-78-C-0505)

To evaluate fatigue improvement heat treatment for Ti-6Al-4V.

The effect of solution treating and water quenching on the axial fatigue life of Ti-6Al-4V will be examined. Variables such as alloy composition, product form, solution treating temperature and stress amplitude will be considered.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0013, EFFECTIVE BEHAVIOR OF COMPOSITE MATERIALS

G.C. Papanicolaou, New York University, Washington Square & University College of Arts & Sciences, Dept. of Mathematics, *421 1st Ave., New York, New York* 10012 (DF053040; AFOSR-78-3668)

AF function - aerospace vehicle design. Deficiency - design techniques for fastening composite materials. Objective - improved understanding of edge effects in composites. How work contributes -cracking and separation of laminates is influenced by stresses due to edge effects.

Asymptotic techniques, including multispace and averaging, have been used to obtain macroscopic equations for media with periodic fine structure-like composites. It is proposed to extend this work to areas including edge effects, irregular structure with associated fluctuation equations, and humidity transport and associated swelling, as for example in epoxy.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0014, COMPUTATIONAL STUDY OF NON-ADIABATIC EFFECTS IN ATOM-MOLECULE REACTIVE SCATTERING

M. Redmon, Battelle Memorial Inst., Battelle Columbus Laboratories, *505 King Ave., Columbus, Ohio* 43201 (DF054510; F49620-79-C-0050)

AF function - Air Force operations in detection, surveillance and other areas require knowledge of gas phase energy exchange mechanisms. Deficiency - there is a lack of detailed understanding of how energy transfer occurs between species in the atmosphere and in lasers. Objective - the goal of this research is to develop quantum mechanical computational techniques to study non-adiabatic effects in three-dimensional atom-diatom collisions. How work contributes - the results of this effort will lead to a fundamental understanding of energy exchange processes in atmospheric chemistry, combustion and lasers.

The first phase of this program will be devoted to obtaining a computationally feasible basis for representing the scattering wave function for rearrangement collisions involving ground- and excited-state carbon and oxygen with singlet sigma and doublet pi molecules. Then, couplings responsible for non-adiabatic transitions will be obtained, initially from diatomics-in-molecules theory.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0015, OXIDATION OF NON-OXIDE CERAMICS

A.H. Heuer, Case Western Reserve University, School of Engineering, Dept. of Metallurgical & Materials Science, *University Cir., Cleveland, Ohio* 44106 (DF051830; F49620-78-C-0053)

AF function - high temperature ceramic turbine engines are being developed for the propulsion of Air Force remotely piloted vehicles (RPV). Deficiency - silicon carbide- and silicon nitride-type ceramics, formed by sintering or hot pressing powders, are subject to high temperature degradation in the extreme turbine operating environments. Creep, oxidation and microstructural changes within the ceramics need to be evaluated. Objective - the objective of this research is to study and understand the microchemistry and structural events which dictate the observable property changes in non-oxide ceramics. How work contributes - understanding the micro-events will allow a rational approach to be taken in the selection of chemical composition and processing techniques for improved materials.

Non-oxide ceramics such as silicon carbide and silicon nitride will be studied with a high voltage transmission electron microscope (HVTEM). An environmental cell for in situ chemical reactions and stress applications will be utilized. The microstructure and distribution of phases will be correlated with microchemical analysis to elucidate the mechanisms of important chemical and physical property changes in these materials.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0016, PARAMETERS AFFECTING THE THERMAL STABILITY AND HEAT SINK OF HYDROCARBON AIRCRAFT FUELS

R.P. Bradley, U.S. Dept. of Defense, Air Force, Aero Propulsion Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF453720)

The objective of this study is to provide the information necessary for specifying fuels which will be capable of providing cooling and propulsion for engines powering aircraft in the speed range from subsonic to above Mach 3. Both conventional and new thermal stability devices will be evaluated with regard to the effect of the following variables on test precision and the significance of results: 1. Pretest filtration - necessity and amount. 2. Dissolved oxygen - level and control. 3. Test pump contributions. 4. Procedural techniques -controlling certain areas. 5. Test preparation and procedure.

In this program, conventional, experimental and hardened solar cells will be subjected to neutron, pulsed electron, proton and various other types of radiation in cooperative tests with agencies such as AFWL, AFNETF, SAMSO and NRL. Test results will be evaluated to determine how solar cells survive Van Allen belt radiation and how closely they meet nuclear hardening goals supplied by the SAMSO for this program.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

3.0017, WEAPONRY - THE ROLE OF CHEMICAL BONDING IN THE STRENGTH OF ADHESION IN POLYMERS

A.N. Gent, University of Akron, Inst. of Polymer Science, *302 E. Buchtel Ave., Akron, Ohio* 44304 (DN675225; N00014-76-C-0408)

The objective is to determine how the adhesive strength of polymeric materials is related to the type and density of interfacial bonds, the rate of detachment and temperature. This fundamental knowledge is necessary to guide missile propellant developers to select the optimum bonding agents. The data will also be useful as inputs into fracture mechanics analyses of propellant grain response to stress. Propellant fracture must be avoided to insure stable burning and to preclude the deflagration to detonation transition.

Functionalized and characterized synthetic polymer substrates will be interfacially reacted to produce an adhesive interface. Surface bond density will be altered and the strength of adhesion will be determined as a function of temperature and the rate of detachment. Adhesives similar to those in propellant manufacture will also be characterized.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0018, SURFACE REINFORCEMENT OF GAS TURBINE COMPONENTS BY REFRACTORY COATINGS DEPOSITED BY MEANS OF VACUUM PYROLYSIS

S.R. Brown, U.S. Dept. of Defense, Navy, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate, *Warminster, Pennsylvania* 18974 (DN881212)

Utilize vacuum pyrolysis techniques to develop wear-, oxidation-and sulfidation-resistant coatings for advanced aircraft propulsion system components, including hot pressed ceramic and super-alloy hot section components.

The advantages of vacuum pyrolytic techniques will be exploited to impregnate and coat thin-walled and holed structures with novel refractory materials.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

3.0019, NAVY VEHICLE DESIGN AND CONSTRUCTION - CONTROLLING SOLIDIFICATION VARIABLES TO DEVELOP DESIRED PROPERTIES IN CAST METAL ALLOYS

H.D. Brody, University of Pittsburgh, School of Engineering, Dept. of Metallurgical & Materials Engineering, *402 Engineering Hall, Pittsburgh, Pennsylvania* 15213 (DN823163; N00014-75-C-0800)

Many naval components are used in the as-cast form. Mechanical properties of castings and directionally solidified composites are directly related to the cast structure and any alloy segregation that occurs during solidification. This research is aimed at improving properties of castings through control of the process variables.

An analytical model of the continuous casting process will be extended to account for grain structure and chemical segregation. High temperature peritectic alloy systems (Ti-Al, for example) will be directionally solidified to produce aligned two-phase and single phase structures. Properties and potential applications will be evaluated. Segregation in aluminum-copper alloys will be examined to determine effects of grain shape, solidification rate and fluid motion.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0020, FORMAL AND COMPUTATIONAL STUDIES IN THE QUANTUM THEORY OF MOLECULAR DYNAMICS

D.J. Kouri, University of Houston, School of Arts & Sciences, Dept. of Chemistry, *3801 Cullen Blvd., Houston, Texas* 77004 (CHE79-19098)

This grant supports research under the Quantum Chemistry Program for the development of approximation methods in molecular collision theory. The main thrust of the project concerns applications of the sudden approximation to rotationally inelastic scattering, surface scattering, photodissociation, and the statistical mechanics of reacting fluid mixtures. Studies of this kind are likely to bring better quantitative understanding and extend the range of applicability of theory to these processes.

Specifically, Professor Kouri will continue his investigations of the energy-sudden and centrifugal-sudden approximations. Sudden approximations will also be developed and applied to diatom-surface and photodissociation processes. For the former, Professor Kouri will study factorization relations, variation of rotational excitation with diffraction peak, polarization effects, heating (or cooling) of diatoms by surface collisions and model interactions. He will also examine factorization in sudden treatments of identical molecule collisions. A new approach to statistical mechanics of reacting mixtures will be investigated with emphasis on the derivation of a Boltzmann-type equation, including break-up. An objective of the research is to study the effects of reactions on generalized relaxation phenomena such as line shapes and NMR spin-lattice relaxation.

This is a renewal of research currently supported by NSF grant CHE7618970 at the University of Houston.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Chemistry

3.0021, THE ACCELERATED CHARACTERIZATION OF POLYMER-BASED FIBER-REINFORCED COMPOSITES

H.F. Brinson, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Engineering Science, *Blacksburg, Virginia* 24061 (NCC 2-71)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

3.0022, FRACTURE MECHANISMS IN FIBROUS COMPOSITES

P.W. Beaumont, University of Cambridge, *Hills Rd., Cambridge, England, United Kingdom* (DF052720; AFOSR-78-3644)

AF function - future high performance flight vehicles will require improvements in structural efficiency. Deficiency - inadequate understanding of composite fracture exists when environmental exposure is considered. Objective - the objective of this research is to understand and develop a theory to predict fracture of advanced composites and hybrids under conditions of elevated temperature and moisture. How work contributes - this research contributes to the Air Force's ongoing effort in advanced composite structures technology.

Both theoretical and experimental efforts will be pursued under this research grant. Fracture mechanisms such as relaxation, debonding, pull-out, splitting, crazing, etc., will be studied under environmental exposure conditions. Both crack initiation and propagation behavior will be investigated. In addition, the behavior of hybrid composites will be considered. Fibers to be studied include glass, graphite and Kevlar.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, PROPULSION SYSTEM COST REDUCTION

W.S. Crownover, U.S. Dept. of Defense, Army, Missile Research

& Development Command, Technology Lab., *Redstone Arsenal, Huntsville, Alabama* 35809 (DA0F1409)

Demonstrate a low-cost propulsion technology package applicable to free-flight rocket motors and other high-production system motors.

This effort will exploit promising concepts and analytical techniques for reducing rocket motor costs. Areas of consideration will include adaptation of tubular products (metal and composite), low-cost nozzle/closure forming and joining methodology and a braided fiberglass integral case/nozzle concept demonstration. Demonstration motor firings will be conducted for selected concepts to generate performance parameters. Participation will continue in the tri-service program to develop a body of information that relates propulsion system requirements to propulsion life-cycle tests. Also included will be an effort on service life prediction which will combine development and verification of realistic thermal loads with improvement to the methods for assessing propellant grain crack forcation and propagation. The effect of field and operational environments on rocket motors will provide engineering data to support propulsion design activities.

SUPPORTED BY U.S. Dept. of Defense, Missile Research & Development Command, Propulsion Directorate

4.0002, DESIGN, DEVELOPMENT AND TEST OF FLUIDIC ELECTRONIC RATE SENSOR

D.J. Schaffer, Signal Co. Inc., Airesearch Manufacturing Company, *402 S. 36th St., Phoenix, Arizona* 85034 (DN890219; N00019-79-C-0455)

Conduct a project to design, fabricate and test a breadboard angular rate sensor as an alternate to rate gyroscopes for altitude stabilization and guidance systems for air-to-air interceptor missiles and RPVs.

The approach to be taken in conducting this project will be to establish a specific missile application where the need exists for a low-cost rate sensor. Determine the required configurations and evaluate them to determine the best-suited. Determine the breadboard model following the design analysis. Fabricate and test the breadboard model to determine performance, i.e., dynamic range, frequency bandwidth, and temperature-drift characteristics.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0003, ADAPTABLE WALL WIND TUNNELS FOR V/STOL RESEARCH

W.R. Sears, University of Arizona, School of Engineering, Dept. of Aerospace & Mechanical Engineering, *Tucson, Arizona* 85721 (DN975112; N00014-79-C-0010)

The ability to predict the performance of V/STOL aircraft in the vicinity of the ground and in transitional flight depends critically upon the accuracy of experimental data obtained in wind tunnels. Such data are plagued by uncertain corrections because of the presence of the tunnel constraining walls which interact with the highly deflected, vortical flows. The proposed research will examine the feasibility of the adaptable wall concept--a concept in which measurements made in the flow field far from the model are used in an active loop to control the flow through the walls--to minimize the wall interference effects for V/STOL flight.

To assess the value of the adaptable-wall concept in the V/STOL regime, a study will be undertaken of three-dimensional flows characterized by large lift coefficients (large deflections) and significant wake effect, to determine what the requirements of an adaptable wall tunnel are. Mathematically, the problem is to determine what boundary conditions, enforced in the midfield of the flow about a real V/STOL configuration, uniquely determine the inner field and assure that it is part of the desired overall flow field. From a practical viewpoint, there are additional questions which must be addressed: what flow variabls should be measured and where; what flow variables must be controlled and where to establish the proper boundary conditions accurately and rapidly.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0004, MATERIAL SUPPORT TECHNOLOGY - STUDY OF SEMICONDUCTOR STRUCTURES

J.W. Mayer, California Inst. of Technology, School of Engineering, Dept. of Electrical Engineering, *1201 E. California Blvd., Pasadena, California* 91109 (DN475233; N00014-75-C-0564)

Development of new electronic devices and device fabrication techniques for Navy systems is dependent on better understanding and exploration of new concepts in solid-state electronic materials.

Solid-phase reactions are studied in metal semiconductor and semiconductor-semiconductor layered structures. Various thin film analysis techniques are used, including transmission electron microscopy and ion backscattering. Amorphous layers of silicon will be produced by ion implantation. Epitaxial regrowth will be studied as a function of implanted impurity substrate orientation, and type of annealing process, thermal, laser or electron beam heat pulse. Growth of sputtered amorphous silicon layers will be studied for comparative purposes. Metal-silicon films will be investigated to determine the mechanisms for silicide formation. Various metal film deposition techniques are used and differences in the resulting silicides investigated.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0005, EXPERIMENTAL INVESTIGATION OF VELOCITY BIASING IN LASER DOPPLER ANEMOMETER MEASUREMENTS

D. Modarress, California State University & Colleges, California State University, Long Beach Campus, School of Engineering, Dept. of Mechanical Engineering, *6101 E. 7th St., Long Beach, California* 90840 (NCA 2-382001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

4.0006, BOOST SUSTAIN INTEGRATION STUDY

T. Piercy, Marquardt Co., *16555 Saticoy St., Van Nuys, California* 91409 (DF462490; F33615-78-C-2034)

Develop and demonstrate non-ejectable inlet covers for RAMJET engine. Configurations of interest are 2-dimension inlets. Assess drag in both open and closed position.

Analyze, fabricate and test hinged inlet covers. Determine actuation loads and mechanism for in-flight conditions. Assess in wind tunnel testing. Using testing results, evaluate any degradation in missile performance, relative to average velocity and/or range. Utilize computerized trajectory analysis.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

4.0007, NAVY VEHICLE DESIGN AND CONSTRUCTION - FUNDAMENTAL AERODYNAMIC STUDIES OF WING-BODY INTERFERENCE AT HIGH ANGLES OF ATTACK

J.N. Nielsen, Nielsen Engineering & Research Inc., *510 Clyde Ave., Mountain View, California* 94043 (DN875550; N00014-78-C-0490)

A method has been developed for calculating with reasonable accuracy the forces and moments on the components of cruciform missiles at high angles of attack (up to 50 degrees) and Mach numbers up to 3.0. As a result of this work, a problem area has emerged which limits the accuracy and usefulness of this calculation method. As either angle of attack or Mach number is increased, the effect of the body on the wing is to substantially decrease the wing lift. It is not clear what causes the large wing-body interference and theoretical calculations to quantify the adverse effects are not available. The objective of this program is to determine the causes of the adverse wing-body interference and to establish the theory and methodology which will allow calculation of the interference effects.

A fundamental study of wing-body interference effects at high angles of attack and supersonic speeds for missile configuration will be conducted. Recent advances in viscous and inviscid numerical computation techniques will be utilized, supplemented by detailed experimental work. The flow field in which a fin or wing might operate at high angles of attack and high Mach numbers will be calculated by extending a computer program for solving the Euler equations of motion for compressible flow. Later, vortex effects will be included. The predicted aerodynamic characteristics will be compared with experimental aerodynamic data.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0008, SEARCH FOR STABLE ONE-DIMENSIONALLY CONFINED PLASMA CONFIGURATIONS

O. Buneman, Stanford University, School of Engineering, Dept. of Electrical Engineering, *Stanford, California* 94305 (ENG78-01559)

The equilibrium properties of planar plasma configurations will be investigated from a theoretical and numerical point of view, with the objective of determining those characteristics that result in stable configurations. Interest will focus on 'plywood' models in which current filaments in the plasma flow in different directions as one progresses through successive layers of the structure. Particular attention will be placed on the numerical methods. An effort will be made to reduce the computations needed to analyze particular structures. The analysis will include considerations of the effects of magnetic fields other than those arising from the current distribution and the effects of particles whose motion remains undetermined in the formulation.

This is a continuation of research previously supported under NSF grant ENG-7602402.

SUPPORTED BY U.S. National Science Foundation, Directorate for Engineering & Applied Science

4.0009, ADAPTIVE TECHNIQUES IN COMMUNICATIONS AND CONTROL THEORY

K.S. Narendra, Yale University, School of Engineering, Dept. of Engineering & Applied Science, *206 Elm, New Haven, Connecticut* 06520 (DN123505; N00014-76-C-0017)

The technical objective of this project is to determine an analytically sound basis for the implementation of adaptive electrical and mechanical systems. Such systems find application in many areas of Navy interest, including satellite control, aircraft identification, helicopter control, and communications systems and links.

The approach is rigorous and analytical. Efforts will be made to establish rapidly converging algorithms for the purpose of achieving an optimum design of discrete-time adaptive systems. Parameters which must be considered include the nonlinear feedback nature of such systems, a gain schedule which permits system tracking and noise filtering, and analytical rules for the prediction of stability of such systems.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0010, THERMAL AND ELECTRICAL TRANSPORT CHARACTERISTICS OF OPTICAL INTEGRATED CIRCUITS

R.G. Hunsperger, University of Delaware, School of Engineering, Dept. of Electrical Engineering, *Newark, Delaware* 19711 (ECS77-20798 A01)

This research program has two basic goals: to provide new fundamental information on the thermoelectric properties of semiconducting materials that are used to fabricate optical integrated circuits, and to develop injection lasers which monolithically incorporate heat-spreading and heat-pumping (Peltier effect) structures for cooling of the lasing p-n junction. The effectiveness of a layer of bismith-telluride (Bi3Te2) and lead telluride (PbTe) in the Peltier cooling stages is being examined. Insofar as possible the fundamental thermoelectric properties of vapor-deposited thin films of Bi3Te2 and PbTe are being investigated, and the effect of lattice damage on the thermal and electrical properties of gallium aluminum arsenide is being determined.

This action renews the research that is currently supported under NSF grant ECS77-20798.

SUPPORTED BY U.S. National Science Foundation, Directorate for Engineering & Applied Science, Div. of Electrical Computer & Systems Engineering

4.0011, RADIATION VULNERABILITY AND HARDENING

J.W. Butler, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN680021)

The objective of this work is to develop techniques, procedures and methods that will lead to more radiation-resistant electronic components for Navy applications.

The technical approach of this work is to apply the techniques and instrumentation of nuclear physics research to the basic problems encountered in radiation hardening of electronic components. For example, the implantation of certain ions in metal oxide semiconductor devices has been found to make them more resistant to radiation damage than they would otherwise be. A 5-mv Van de Graaff accelerator and a 200-kv HV transformer accelerator provide a wide variety of ions for implantation. The location of these ions in the device is important in determining their radiation hardness, and under certain conditions implanted ions tend to migrate. Nuclear reaction techniques are used for ascertaining depth concentration profiles of the implanted ions.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

4.0012, AUTONOMOUS SATELLITE SENSOR PROGRAM

F.L. Markley, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN980065)

The purpose of this effort is to study the accuracy of determination of a spacecraft's attitude and ephemeris by autonomous navigation methods utilizing combinations of star sensors, landmark recognition systems, and inertial reference units and to study the influence of spacecraft non-rigidity on the accuracy attainable.

The study will utilize an error covariance analysis based on optimal estimation techniques and containing models of the spacecraft dynamics (linearized), various sensor configurations, and expected distributions of stars and landmarks. The study will analyze both the absolute accuracy of the spacecraft attitude and ephemeris determination as well as the accuracy with which the location of objects on the earth's surface relative to the landmarks can be established.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

4.0013, APPLICATIONS OF SEMICONDUCTOR MATERIALS

W.J. Moore, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN620099)

To obtain basic knowledge of the electrical and optical properties of semiconductor materials which limit the performance of solid-state devices of interest to the Navy. Of particular interest are materials which have application as active microwave devices or as infrared detectors, including both elemental and compound semiconductors.

Electrical and optical properties of selected materials are determined by using measurements such as optical and magnetooptical spectroscopy, photoconductivity, transient capacitance spectroscopy, Hall effect and noise studies. Such measurements are carried out on specially prepared bulk material and epitaxial

layers produced in-house, on MIS structures, and on commerical devices such as prototype infrared detectors.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

4.0014, DERIVATION AND COMPARISON OF OPTIMAL FILTERS II

M.E. Warren, State University System of Florida, University of Florida, School of Engineering, Dept. of Electrical Engineering, *220 Black Hall, Gainesville, Florida* 32611 (DF642750; F08635-78-C-0179)

Air Force function - development of advanced guidance algorithms for tactical air-to-air missiles. Deficiency or opportunity - to increase percent kill of highly maneuvering target aircraft. Objective - the objective of the effort is to develop and compare various estimation techniques that have potential application to short-range air-to-air missiles. Various estimation techniques will be developed to obtain the required states/parameters for implementing the types of guidance laws derived under previous contract efforts.

The approach for this effort will be for the contractor to determine the various states/parameters required to implement the guidance laws derived under previous contractual efforts. The contractor will analytically assess the feasibility of applying various estimation techniques for estimating the necessary states/parameters. These estimation techniques will include splines, polynomial estimation, function estimation, and adaptive filtering. The contractor will fully develop the most promising techniques and evaluate the derived estimation algorithms using a complete non-linear 6-DOF simulation with a generic missile model.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Armament Lab.

4.0015, INTERDISCIPLINARY COLLABORATION IN TRIBOLOGY

W.O. Winer, Georgia Inst. of Technology, School of Mechanical Engineering, *225 North Ave. N.W., Atlanta, Georgia* 30332 (NCC 3-14)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0016, LIGHTNING PROTECTION FOR WIND TURBINES STUDY

C.W. Dodd, Southern Illinois University, Carbondale Campus, School of Engineering & Technology, Dept. of Electrical Sciences & Systems Engineering, *Carbondale, Illinois* 62901 (NCC 3-7)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0017, GRADUATE STUDENT RESEARCHERS PROGRAM

T.H. Okiishi, Iowa State University of Science & Technology, School of Engineering, Dept. of Mechanical Engineering, *496 Town Engineering Bldg., Ames, Iowa* 50011 (NGT 16-002-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0018, INVESTIGATION OF MECHANISMS AFFECTING ENVIRONMENTAL STRESS CRACKING IN TITANIUM ALLOYS

I.J. Graham, Southern University Agricultural & Mechanical College, Baton Rouge Campus, School of Engineering, Dept. of Mechanical Engineering, *Baton Rouge, Louisiana* 70813 (DN890058; N00019-78-C-0065)

Program to investigate mechanisms affecting environmental stress craking in titanium alloys. Also to determine rate of crack growth in a mechanical environment on high-strength aircraft structural alloys.

Use the fracture mechanics approach with the application of acoustic emission test techniques to predict the useful life of a structure subjected to sustained and/or cyclic loads under certain controlled environments at designed temperatures and pressures.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0019, RADAR

K.H. Shreeve, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Weather Service, Systems Development Office, Equipment Development Laboratory, *8060 13th St., Silver Spring, Maryland* 20910 (8AA8302)

OBJECTIVE: The objective of the NEXRAD program is to upgrade the NWS primary weather radar facilities with new Doppler radars, digital data collection and processing, graphic displays, and expedient communications equipment.

APPROACH: Actively participate in the RADAR procurement. Develop the functional NEXRAD design and continue efforts to improve the operational usefulness of NEXRAD systems. Continue development of improved radar data display and communications.

PROGRESS: This project has been underway for several years. The EDL effort is supportive of the overall development and deployment of a new radar system. RADAR equipment will be under contract in the 1st quarter of FY1980. Initial color weather radar display has been developed and experimentally tested at NSSL.

SUPPORTED BY U.S. Dept. of Commerce, National Weather Service, Systems Development Office

4.0020, FLIGHT DYNAMICS - RESEARCH IN AERODYNAMICS AND RESEARCH IN BALLISTICS

R.H. Krieger, U.S. Dept. of Defense, Army, Armament Research & Development Command, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005 (DA0N4437)

This project covers exterior ballistics research in aerodynamics related to projectiles and missiles and the factors affecting their flight behavior and environments. Significant studies undertaken involve methods to obtain static surface pressure measurements on non-spinning secant-ogive-cylinders; to develop a method and obtain surface pressure measurements on spinning bodies of revolution using a wind tunnel telemetry technique and to develop a finite difference computer program for computing the three-dimensional boundary layer development on spinning bodies.

These objectives are to be met through theoretical analysis and experimental testing in the BRL closed circuit variable density, continuous flow supersonic wind tunnels.

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Ballistic Research Lab.

4.0021, DYNAMIC BALLISTIC TESTING-FLIGHT DYNAMICS AND BALLISTIC TECHNOLOGY

L.C. MacAllister, U.S. Dept. of Defense, Army, Armament Research & Development Command, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005 (DA0A4562)

This project includes ballistic range instrumentation and data analysis improvement and full range projectile dynamics. These applied research programs in the fields of aerodynamics and flight mechanics contribute to the design of, evaluation of, and data base for artillery shell, small arms, missiles and rockets. Tasks covered are the design and test of a projectile with the non-conical boattail concept in full scale artillery calibers including usual real features such as rotating band and fuzing details, the design and procurement of improved optics for range shadowgraphic instrumentation and improved time-base investigations characterizing launch yaw for artillery shell-weapon combinations.

Range and data analysis improvements are pursued by monitoring new developments and implementing applicable ones as well as in-house development. Flight test programs are conducted at the BRL and at other test facilities, and the results ana-

lyzed to support the projectile dynamics and non-conical boattail objectives.

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Ballistic Research Lab.

4.0022, MOLECULAR GAS OSCILLATORS/AMPLIFIERS

G.J. Simonis, U.S. Dept. of Defense, Army, Electronics Research & Development Command, Harry Diamond Lab., *2800 Powder Mill Rd., Adelphi, Maryland* 20783 (DA0F5730)

The near-millimeter (nmm) portion of the spectrum, 0.3-2.5mm, will play an important role in close support, remote sensing systems which (1) operate well under smoke, inclement weather, or cloud environments, (2) provide high resolution capability and (3) are secure in terms of countermeasure vulnerability. Nmm technology addresses these requirements, being an attractive compromise between the high resolution capability of ir systems and the low propagation loss characteristics of microwave operation. The objective of this program is to foster and contribute to the development of the technology base in this relatively unexplored portion of the em spectrum.

The nmm technology program is based upon three complimentary approaches. First, an in-depth study is being conducted of the state-of-the-art to (1) define current and future systems requirements, and (2) identify technology gaps and research efforts to fill these gaps. Second, an in-house research program is underway for the development of nmm sources which have practical power/size capabilities and high spectral purity. The third portion of this program is an out-of-house effort in three areas - sources, receivers and propagation effects.

SUPPORTED BY U.S. Dept. of Defense, Electronics Research & Development Command, Harry Diamond Lab.

4.0023, SYSTEMS ANALYSIS FOR A DUAL MODE (PULSE-UP) TRANSMITTER

J. Fritsch, Westinghouse Electric Corp., *P.O. Box 746, Balt-Wash Internat. Airport, Baltimore, Maryland* 21203 (DN081336; N62269-79-OI-92920)

To provide NavAirDevCen with technical assistance in conducting a systems analysis to specify dual mode transmitter designs that satisfy the spectrum of mission requirements of Navy aircraft, e.g., advanced F/A 18, advanced F 14, reconnaissance, ASW, etc. The dual mode transmitter offers the waveform flexibility of two transmitters. This allows the waveform to be optimized over a broad range of mission requirements. This work supports work unit AJ302, Agency Accession No. DN 081335.

The contractor is to survey the missions and threats of advanced Navy aircraft and determine mode requirements. He will then translate the mode requirements to radar requirements and identify minimum/maximum values that drive the transmitter in terms of strengths and limitations of critical parameters. Finally, a trade-off analysis of critical parameters will be conducted and a family of dual mode transmitter designs will be specified.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Sensors & Avionics Tech Directorate

4.0024, NAVY VEHICLE DESIGN AND CONSTRUCTION - DESIGN TECHNIQUES FOR MULTIVARIABLE DIGITAL CONTROL SYSTEMS WITH MULTIPLE SAMPLE RATES

S.W. Gully, Analytic Sciences Corp., *6 Jacob Way, Reading, Massachusetts* 01867 (DN975440; N00014-79-C-0431)

During the design of a digital flight control system, it can be advantageous to have different feedback loops sampled at separate rates in order to save on computer requirements. For example, the response characteristics of an inner stability loop and an outer guidance loop are usually an order of magnitude apart and, therefore, the sample rates of each loop can also differ by the same amount. No modern control theoretic technique exists for designing multivariable digital control systems with multiple sample rates. The purpose of this project is to develop practical synthesis and analysis methods for multirate digital control systems.

The optimal multirate control problem will be formulated by starting with the optimal multirate estimation procedure which has been developed by the contractor. The general optimal multirate estimation and control problem will then be solved. The algorithms which are developed will be exercised on a realistic aircraft with multirate sensors and actuators. Optimal multirate control law and state estimation will be constructed and compared with single rate designs to illustrate the advantages and differences in complexity between them. An algorithm which will automatically guarantee a stabilizing initial starting property will be developed.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0025, LARGE APERTURE SYSTEM APPLICATIONS

F. Ayer, Charles Stark Draper Lab. Inc., *68 Albany St., Cambridge, Massachusetts* 02139 (DF911430; F30602-78-C-0128)

The objective of this effort is to assess active control concepts for disturbance suppression and performance enhancement of large aperture, ultra-lightweight space radar antennas. Also to develop design criteria for improved performance of such antennas with and without active control.

Active control approaches shall be analytically investigated for distortion suppression of modeled disturbance characteristic of large aperture, ultra-lightweighted radar antennas for space applications. Mechanical/electrical implementations shall be assessed for both reflective and phased array antennas. Performance benefits shall be contrasted against passive distortion suppression approaches.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0026, HIGH TEMPERATURE TURBINE ROTOR MATERIAL

Unknown, General Electric Co., *1000 Western Ave., West Lynn, Massachusetts* 01910 (DF463780; F33615-79-C-2043)

Investigate the use of carbon/carbon material in the turbine rotor of a small (500 to 1000 pounds thrust), 50-hour-life turbofan engine. The rotor will operate at 2500 degrees F and the blading will not require any cooling air.

The basic contract will be a design study of a turbine rotor in a 2500 degrees F TIT of a small turbofan and will also include a carbon/carbon material definition effort. Possible follow-on efforts include design, fabrication and test of a carbon/carbon turbine rotor.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

4.0027, MATERIAL SUPPORT TECHNOLOGY - GRAPHITE INTERCALATION COMPOUNDS

M.S. Dresselhaus, Massachusetts Inst. of Technology, School of Engineering, Dept. of Electrical Engineering, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DN775125; N00014-77-C-0053)

Intercalated graphite compounds have exhibited high conductivities. Research has been directed towards achieving conductivity equal to or greater than that for copper. Many naval systems could benefit from a light, strong metallic fiber. The objective of this program is to determine the electronic structure of these compounds in order to correlate the electrical behavior with their atomic structure and composition, with the view to being able to design better conductors.

Metallic graphite intercalation compounds are studied by Raman and infrared spectroscopic techniques to determine those lattice modes which can be identified with vibrations of the carbon atoms in the graphitic layers and other modes specific to each intercalate specie. These results are combined with theoretical studies to determine the electronic structure of the compound when graphitic and intercalated layers are brought together to their equilibrium separation in the intercalation compound. Both acceptor and donor intercalation compounds are studied and special attention is given to the symmetry properties

of the Raman and infrared spectra to provide information on the inplane ordering of the intercalated layer planes.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0028, TRIBOLOGY ASSESSMENT
W.R. Wilson, University of Massachusetts, Amherst Campus, School of Engineering, Dept. of Mechanical & Aerospace Engineering, *Amherst, Massachusetts* 01002 (NCC 3-10)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0029, INTERDISCIPLINARY COLLABORATION IN TRIBOLOGY
K.C. Ludema, University of Michigan, Ann Arbor Campus, School of Engineering, Dept. of Mechanical Engineering, *Ann Arbor, Michigan* 48104 (NCC 3-11)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0030, FEASIBILITY DEMONSTRATION OF A RAFT SYSTEM
D. Meitner, Air Cruisers Co., *P.O. Box 180, Belmar, New Jersey* 07719 (DN781462; N62269-76-C-0273)

Demonstrate the feasibility of a helicopter installed system designed to provide deceleration during free-fall, and subsequent flotation, of a high value cargo that has been intentionally jettisoned or inadvertently dropped during vertical replenishment operations over water. Automatic deployment of the system is planned to prevent specified levels of damage to the cargo upon impact with the water, to avert sinking and to facilitate recovery by surface ship or helicopter. This contract supports work unit PH104, Agency Accession No. DN681034.

It is planned to conceive, analyze, and design a raft system, including its method of attachment, which is capable of meeting the objectives specified in statement of work SOW 3041-21; to fabricate feasibility test hardware, and to support NavAirDevCen personnel in subsequent flight tests.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

4.0031, EFFECTS PRODUCED BY VARIOUS DEFECTS IN SOLID-STATE LASER DEVICES
F. Witt, U.S. Dept. of Defense, Army, Armament Research & Development Command, Fire Control & Small Caliber Weapon Systems Lab., *Picatinny Arsenal, Dover, New Jersey* 07801 (DA0B0731)

To determine the effect of various crystal inhomogeneities on the ability of laser systems to generate and transmit energy efficiently.

A very fast and highly successful high resolution X-ray method has been developed in-house and is described in the report numbered FA-M72-20-1. The method is capable of detecting substructure variations in the submicron range caused by dislocation networks. It has the potential to reveal the existence of crystal inhomogeneities (such as dopant concentration gradients, impurities, inclusions, precipitates and thermal strains) introduced by the Czochralski or the top-seeded solution crystal-growing techniques. X-ray studies - after high quality photographs are taken on good and marginal quality material, we propose to perform strain measurements on the relative conic movement of a number of accurately determined positions of YAG, YLF, Li-niobate, and NdLa2Be2O5 crystals. The strain will be measured in at least six directions in the crystal so that quantitive determinations of the principal strains and their directions can be made.

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Fire Control & Small Caliber Weapon Systems Lab.

4.0032, AUTOMATIC TEST TECHNIQUE DEVELOPMENT FOR ADVANCED ELECTRO-OPTICAL SYSTEMS
A. Lemasters, U.S. Dept. of Defense, Navy, Naval Air Engineering Center, *Lakehurst, New Jersey* 08733 (DN096119)

Develop and recommend automatic test techniques for advanced electro-optical systems and subsystems. Develop testability guidelines for future e-o avionics systems.

Support concepts and ground support equipment requirements must be considered at design inception. New testing techniques/concepts and test interface requirements developed will be converted into a testability guideline or specification to be included in development specifications for future electro-optical avionics systems.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0033, ELECTROMAGNETIC CAMOUFLAGING TECHNIQUE
B.K. Singaraju, U.S. Dept. of Defense, Air Force, Weapons Lab., *Kirtland Air Force Base, Albuquerque, New Mexico* 87117 (DF194870)

This work deals with the use of impedance loading of scatterers in an attempt to electromagnetically camouflage objects such as aircraft, missiles and satellites to confuse the enemy radar. This is a theoretical investigation.

Electromagnetic response of a body depends upon the natural frequencies of the body and is dependent on the incident pulse. In this work, we will investigate the use of the impedance loadings to shift the natural frequencies of one body to resemble those of another body. Eigen impedance concepts will be investigated to calculate the eigen impedance and required loadings for a perfectly conducting sphere and this wire.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Weapons Lab.

4.0034, NAVY VEHICLE DESIGN AND CONSTRUCTION - TRANSONIC ANALYSIS OF TWO-ELEMENT AIRFOILS
G. Volpe, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN575295; N00014-75-C-0722)

This research is directed towards developing a completely theoretical solution to the analysis and design of transonic two-element airfoil configuration. The use of such two-element airfoil configurations such as slats has improved performance of combat aircraft at transonic speeds where air-to-air combat usually occurs. However, the reasons for the effectiveness of slats or flaps at transonic speeds are not presently well understood and good slat or flap designs are experimentally arrived at through expensive wind tunnel test programs.

A three-phase program is being conducted to develop a systematic and efficient numerical procedure for the design of multi-element airfoil systems for high lift at transonic flight conditions. Under the two completed phases, a viscous transonic flow analysis has been developed. The procedure predicts pressure distributions and force and moment coefficients for multi-element configurations with boundary-layer effects included. The current phase is concerned with the development of an effective inverse method to determine multi-element airfoil systems by specifications of a desired pressure distribution and free-stream Mach number.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0035, BACKSCATTER/FORWARD-SCATTER/TERRAIN-SCATTER RELATIONS
R.J. Papa, U.S. Dept. of Defense, Air Force, Rome Air Development Center, *Griffiss Air Force Base, Rome, New York* 13441 (DF904630)

AF function - surveillance. Deficiency/opportunity - existing surveillance radar systems have difficulty in estimating the height of low flying aircraft and do not optimize the overall performance capability of the radar. Objective - to predict radar multipath returns over a real earth from a causal relation between backscatter and forward-scatter returns and other site-dependent data. Also, to improve existing multipath models for

specular and diffuse scattering. How research contributes - improved multipath models will yield more accurate determination of the positions of aircraft and improve a radar system's performance in a more cost-effective fashion. The results of these investigations will be applied to several radar sites along the dew-line (Project Seek Frost).

Utilize existing models of scattering from random, rough surfaces and correlate theoretical and computer models with experimental data. Types of terrain and sea states will be delineated for which an accurate theoretical model exists capable of giving a causal relationship between the forward scattering (multipath) and backscatter (clutter). Theoretical and computer models will be extended to include the effects of terrain screening, shadowing and multiple scattering, and these models will be compared with experimental data taken under contract. The types of terrain to be investigated will be selected from several sites along the dew-line.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0036, IONOSPHERIC PROPAGATION SIMULATION

W.K. Ring, U.S. Dept. of Defense, Air Force, Rome Air Development Center, *Griffiss Air Force Base, Rome, New York* 13441 (DF902790)

AF function - long-range detection. Deficiency/opportunity - models for simulating HF propagation in the Arctic (auroral) environment are not sufficient to adequately predict the performance of Air Force systems or provide information for the design of new techniques to improve operational capabilities. Objective - development of new theoretical and numerical models of ionospheric characteristics which influence radio wave propagation and the design of improved ray-tracing techniques. Development of a better understanding of radio propagation through small-scale irregularities in the ionosphere, and improvement of state-of-the-art radio signal detection in the presence of fading and clutter due to propagation through an inhomogeneous ionosphere. How research contributes - this research is directed at improving the inputs to a realistic model of HF propagation, particularly in the auroral region of the ionosphere. These new models, in conjunction with fast and accurate ray tracing, will allow assessment of system performance to be made in near real-time and, with models of auroral HF clutter, allow for both prediction of system performance and improved operational capabilities of existing systems.

New and improved ionospheric modelling techniques will be developed, primarily on the basis of analysis of existing radio propagation data. Data which in the past could not be used for this purpose (oblique backscatter data) will be incorporated by the use of newly developed ray-tracing and computational techniques. Data from experimental OTH radars will be used to develop an auroral clutter model. The new ray-tracing techniques will be developed primarily from theoretical considerations, although full advantage will be taken of improvements in the size and speed of modern digital computers.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0037, CRACK GROWTH INITIATION AND PROPAGATION UNDER DYNAMIC LOADING

M.F. Kanninen, Battelle Memorial Inst., Columbus Laboratories, *505 King Ave., Columbus, Ohio* 43201 (DN775733; N00014-77-C-0576)

Naval structures such as aircraft, missiles, submarines, and surface ships are exposed under service conditions to various forms of dynamic loading which can cause fracture and failure of key portions of these systems. Under this task improvements should be effected in dynamic fracture analysis and experimental techniques, which should eventually impact on improved design approaches.

A program of combined experimentation and mathematical analysis was initiated. In the experimental work, attention is focused on developing techniques to determine accurately the load-point displacements and crack length as functions of time in an impact-loaded fracture specimen. In the mathematical analysis work, an asymptotic evaluation of the crack-tip region for dynamic elastic-plastic crack propagation is being pursued.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0038, MARITIME PATROL AIRSHIP STUDY

J.W. Lancaster, Lancaster Analytics, *Canton, Ohio* (DN981128; N62269-78-M-4426)

Provide techical support to Navy LTA computer sizing and performance programs. In support of work unit No. DH814.

Troubleshoot and rectify computer program irregularities.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

4.0039, THERMAL ENERGY STORAGE AND HEAT TRANSFER INVESTIGATION

J.E. Beam, U.S. Dept. of Defense, Air Force, Aero Propulsion Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF458500)

To develop the required analytical and experimental heat transfer and metallurgical compatibility data necessary to optimize the design and useable life for surveillance spacecraft VM Cryocooler applications.

A two-phase program is proposed. Phase 1 concerns analytical modeling of transient cycling of cylindrically encapsulated TES-phase change materials, setting up an in-house test capability to allow thermal cycling of liquid metal heat pipes with integral TES, and initiating invacuo metallurgical CLAD/TES compatibility tests. Phase 2 centers on calorimetric testing and cyclic performance mapping of subscale thermal trains and contractual end-item hardware.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

4.0040, CHAFF CLOUD MEASUREMENTS, ANALYSIS AND DEVELOPMENT

V. Pyati, U.S. Dept. of Defense, Air Force, Avionics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF096990)

The objectives of this IH effort are (1) to develop realistic computer models of chaff clouds that account for critical aerodynamic and electromagnetic effects, (2) to obtain and analyze radar cross-section data from measurements of actual chaff clouds, and (3) to perform lab experiments and simulations to determine the signature of new chaff elements and their effects on advanced radars.

The objectives are to be achieved by IH work and by utilizing and combining the work of various contractors. For example, computer programs to compute the RCS of a chaff cloud are being combined with aerodynamic programs that predict chaff element trajectores so that a time-varying RCS can be computed. In addition, IH measurements of the RCS of redesigned chaff will be performed to evaluate the improvements in electromagnetic performance. Measurements of the RCS and Doppler return from chaff clouds will also be performed and analyzed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Avionics Lab.

4.0041, INTERDISCIPLINARY COLLABORATION ON TRIBOLOGY

E.E. Klaus, Pennsylvania State University, University Park Campus, School of Engineering, Dept. of Chemical Engineering, *101 Hammond Bldg., University Park, Pennsylvania* 16802 (NCC 3-9)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0042, LASER VISUAL SYSTEM VTOL/VTRS DESIGN

A. Zepf, American Airlines Inc., *Fort Worth, Texas* (DN094001; N61339-79-C-0123)

To determine the feasibility of installing a laser visual display on the vertical take-off and landing portion of the visual technology research simulator.

An investigation will be made to produce a laser display design for the visual display of VTOL/VTRS and then compare the design with the specification, operational use schedule, and budgetary limitations to determine if a feasible system can be attained for VTOL/VTRS.

SUPPORTED BY U.S. Dept. of Defense, Naval Training Equipment Center, Advanced Simulation Concepts Lab.

4.0043, IAP SURFACE GEOMETRY GENERATION
R. Robertson, Atlantic Research Corp., *5390 Cherokee Ave., Alexandria, Virginia* 22314 (DF737690; F30602-77-C-0126)

The objective of this effort is to develop the algorithms and computer codes to generate within the computer the description of a given geometrical surface to be used as an input for the RADC electromagnetic compatibility analysis codes. Examples of such surfaces include aircraft fuselages, wings and ground-based antenna towers.

The contractor will determine the geometry inputs required by the analysis codes now existing or planned within the framework of the intrasystem compatibility analysis program (ICAP), such as the intrasystem electromagnetic compatibility analysis program (IEMCAP) and the general electromagnetic model for the analysis of complex systems (GEMACS). Based on the requirements determined from this evaluation, the contractor will develop the algorithms and a computer code for a geometry generation module (GGM) that shall interface with the ICAP codes. This will enable the user to enter a physical description of the system geometry into the required solution technique to the degree of accuracy required. Candidate techniques that can be used to generate the surface geometry include generic elements (cylinders, cones, spheres, etc.) and spline function descriptors. The end-items are a computer code and its documentation which can be used in a stand-alone mode or in concert with ICAP codes to mathematically model a physical system as a combination of surfaces.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0044, ELECTRON SPECTROSCOPY OF SEMICONDUCTOR HETEROJUNCTION INTERFACES
M.G. Lagally, University of Wisconsin, Madison Campus, School of Engineering, Dept. of Mineral & Metallurgical Engineering, *Madison, Wisconsin* 53706 (DN775535; N00014-77-C-0474)

The operational properties of solid-state electron devices used in Navy electronic systems are often dominated by the electronic effects occurring at various solid surfaces and solid-solid interfaces. Understanding and controlling the surface effects are essential to improving performance and reliability.

Using surface analysis techniques such as Auger spectroscopy, ultraviolet photoemission spectroscopy, X-ray photoemission spectroscopy, and energy loss spectroscopy, the investigator will probe the local electronic properties of surface atoms. These atoms may represent the host material, absorbed impurities, or atoms of an adjacent host material such as occurs in the semiconductor-semiconductor heterojunction. Determination of the local density of states at each atom will permit evaluation of the effects of impurities or surface states on the overall electronic nature of the surface. Of particular interest is the nature of the energy discontinuity which appears at the heterojunction interface and the changes in local density of states as a result of surface disorder and oxidation.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production and Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, SIZE-FREQUENCY ANALYSIS OF SIMULATED MARTIAN EOLIAN SILT AND CLAY
D. Krinsley, Arizona State University, School of Liberal Arts, Dept. of Geology, *Tempe, Arizona* 85281 (NCA 2-35001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

5.0002, RESEARCH SURFACE TRENDS TO EARTH'S CRUST
Unknown, California State University & Colleges, San Diego State University, Graduate School, *5402 College Ave., San Diego, California* 92115 (NAS 9-16143)

SUPPORTED BY U.S. National Aeronautics & Space Admin.

5.0003, A METHOD FOR EVALUATING THE TRANSPORTS BY MEAN DEVIATORY MOTIONS IN A TWO-DIMENSIONAL MODEL
C.A. Riegel, California State University & Colleges, San Jose State University, School of Science, Dept. of Meteorology, *Washington Sq., San Jose, California* 95192 (NCC 2-73)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

5.0004, NAVY ENVIRONMENT - GEOTECHNICAL PROPERTIES OF SABKHAS
J.I. Collins, Tetra Tech Inc., *630 N. Rosemead Blvd., Pasadena, California* 91107 (DN075358; N00014-80-C-0366)

The objective of this research is to provide a baseline study of the geotechnical properties (surface bearing strength, trafficability, etc.) of sabkha areas of the Persian Gulf region and to investigate the variations of such properties with varying environmental conditions (tidal range, ground water levels, etc.)

The field site for this investigation will be a coastal sabkha near Jubail, Saudi Arabia. Sediment characteristics will be measured using coring devices, shear strength vanes and resistivity probes. Other environmental parameters to be measured include ground-water levels, coastal tides, wind, precipitation and humidity. Multivariate analysis of measured parameters will be used to correlate sabkha properties with satellite remote-sensing parameters.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0005, BLUE/GREEN CLOUD PROPAGATION EXPERIMENT SUPPORT
K.J. Kelley, U.S. Dept. of Defense, Navy, Naval Ocean Systems Center, Communications Systems & Technology Dept., *San Diego, California* 92152 (DN988647)

Provide support for blue/green cloud propagation experiments to be conducted on the island of Kauai, Hawaii, during July and August, 1979. NOSC will support the optical propagation experiments being conducted by H.S.S., Inc. and G.T.E.-Sylvania.

NOSC will support the blue/green cloud propagation experiments via four tasks: (1) provide an instrumented aircraft on-site to provide appropriate cloud meteorological data simultaneous with G.T.E.-Sylvania laser downlink pulse propagation experiments. Data to be provided will be cloud drop size spectra as functions of altitude (10 m resolution), cloud height, cloud thickness, temperature and dew-point. Data will be reduced and provided to G.T.E.-Sylvania, H.S.S. and others at the request of the sponsor; (2) provide funds to PMR Barking Sands, Kauai, for radar support required by the two experimental aircraft; (3) jointly with H.S.S., check-out, evaluate and calibrate two-channel teleradiometer built by H.S.S., at east-coast site. Ship equipment to Kauai. Jointly conduct field test and reduce data with H.S.S.; and (4) observe experiments, make on-site judgment as to the data validity, and provide technical advice (not direction) to all portions of blue/green cloud propagation experiments. Provide interface to sponsor.

SUPPORTED BY U.S. Dept. of Defense, Defense Advanced Research Projects Agency, Strategic Technology Office

5.0006, CLIMATE CHANGE AND THE HISTORY OF GREENLAND
O. Granger, University of California, Berkeley Campus, School of Letters & Science, Dept. of Geography, *Berkeley, California* 94720 (NCA 2-50004)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

5.0007, ECOLOGICAL STUDIES OF THE LUGUNA FIGUEROA DEL NORTE
G.A. Tomlinson, University of Santa Clara, School of Science, Dept. of Biology, *El Camino Rd., Santa Clara, California* 95053 (NCA 2-685008)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

5.0008, MULTI-SENSOR CLOUD DEVELOPMENT STUDIES
V.E. Derr, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab., *Boulder, Colorado* 80302 (8AA71531)

PROJECT OBJECTIVE: Study dynamical development of clouds with emphasis on glaciation in young clouds for purposes of obtaining improved data for models leading to better forecasting of precipitation.

CURRENT YEAR PLAN: Study synoptic cloud development into winter storms, particularly upslope conditions. Study early cumulus development.

PROGRESS REPORT: Development of algorithms to distinguish depolarization from multiple scatter and ice formation. Data analysis of early cloud glaciation in the NCARCSD Experiment of 1978.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab.

5.0009, SPECTRAL ANALYSIS OF LIGHTNING EMISSION IN THE SILICON RESPONSE RANGE
B. Turman, U.S. Dept. of Defense, Air Force, *Air Force Academy, Colorado Springs, Colorado* 80840 (DF282310)

AF function - technology base. Deficiency - lack of information on optical interference effects from lightning. Objective - analyze spectral power levels from lightning. How work contributes - information on spectral power radiated from lightning will allow better design of remote sensing and detection instruments to avoid lightning triggers.

A slitless spectrometer, with silicon photodiode array for data collection, will be used to measure spectral power levels from terrestrial lightning. Emphasis will be placed on the near IR band, up to 1.1 micron wavelength.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Frank J. Seiler Research Lab.

5.0010, PROGRAM OF RESEARCH IN ENVIRONMENTAL MODELING
H. Liebowitz, George Washington University, School of Engineering & Applied Sciences, *725 23rd St. N.W., Washington, District of Columbia* 20037 (NCC 1-39)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

5.0011, REMOTE OCEAN SUBSURFACE TEMPERATURE PROFILES
V.E. Noble, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN680319)

To determine the feasibility of remotely measuring the open ocean subsurface temperature profiles. These measurements will provide quantitative data on air-sea energy exchanges which support meteorological and oceanographic prediction models and also are inputs for sound velocity calculations to predict performance of tactical and strategic acoustics weapons systems. The fundamental problem is to develop a remote sensing capability that measures temperatures below the surface of the ocean.

Utilize the fact that the Raman spectrum centroid shifts with the temperature of the medium, conduct a system analysis for establishing system parameters of a model laser sensor in the visible region for operational measurement of subsurface ocean temperature profiles. Utilize data from field measurements with the feasibility model sensor to define performance parameters for operational systems to meet Navy measurement requirements.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

5.0012, ATMOSPHERIC MODELING
D.F. Strobel, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN880064)

To gain a better physical understanding of fundamental atmospheric processes that drive global-scale weather systems. Results will be incorporated in global naval environmental prediction models by developing suitable parameterization schemes. To gain a basic understanding of stratospheric-tropospheric coupling.

Numerical solutions of the relevant multi-dimensional fluid dynamic equations describe atmospheric processes of interest.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

5.0013, NAVY ENVIRONMENT - TRANSIENT PROCESSES IN OCEAN CURRENTS
W. Duing, University of Miami, D.H. & Lewis Rosenstiel School of Marine & Atmospheric Sci., Dept. of Marine & Atmospheric Sciences, *4600 Rickenbacker Cswy., Coral Gables, Florida* 33149 (DN575081; N00014-75-C-0173)

Increased knowledge of the spatial and temporal variability of oceanic current systems is essential if the Navy is to improve its ASW capability. Not only do these induce changes in sound propagation characteristics needed for ASW, but they also affect other missions such as search and rescue and salvage operations.

Direct observations are made of ocean current systems (such as the Florida current, the Somali current, and the equatorial undercurrent). These observations include moored current meters plus CTD and XBT profiles. In addition, infrared sea-surface temperature maps are obtained from satellites (such as the DMSP) for use in tracking the surface expression of such currents.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0014, SYNOPTIC STUDIES OF SUMMER AND WINTER MONSOONS
T. Murakami, University of Hawaii System, Manoa Campus, School of Arts & Sciences, Dept. of Meteorology, *2444 Dole St., Honolulu, Hawaii* 96822 (04-8-M01-51)

TECHNICAL OBJECTIVES: This grant is concerned with a study of large-scale fluctuations of the summer and winter monsoon circulations. In particular, it will attempt to determine what mechanisms are responsible for the interannual variability of these major circulations.

APPROACH: Objective meteorological analysis, as well as satellite-derived radiation data, will be utilized and studies of energy transfer and conversion processes associated with the monsoon circulation will be carried-out. In addition, the interaction of the monsoon with processes occurring over more distant areas, including those across the equator, will be explored.

PROGRESS: An empirical orthogonal function (EOF) analysis was applied to the satellite longwave cooling data so as to identify the major modes of the summer and winter monsoon circulation. It was found that long period rainfall fluctuations near India are associated with 20-30 day fluctuations in this parameter and move westward along 10-20 degrees N latitude. These appear to originate over the Central and Western Pacific.

The nature of these fluctuations changes from year to year, however.

SUPPORTED BY U.S. Dept. of Commerce, National Weather Service, Climate Analysis Center

5.0015, GRADUATE STUDENT RESEARCHERS PROGRAM
L.J. Rouse, Louisiana State University, Agricultural & Mechanical College, School of Science, Dept. of Marine Sciences, *University Station, Baton Rouge, Louisiana* 70803 (NGT 19-001-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Jet Propulsion Lab.

5.0016, NAVY ENVIRONMENT - UNDER-ICE ROUGHNESS
L.A. Leschack, Leschack Associates Ltd., *1111 University Blvd. W., Silver Spring, Maryland* 20902 (DN675351; N00014-76-C-0757)

The objectives of the proposed work are: (a) to evaluate the geographical and temporal variability of the under-ice roughness parameters in the Arctic ocean; (b) to determine if the roughness parameters seem to remain relatively constant with respect to one another for different geographical areas from year to year, thence to determine whether this geographical variability can be well correlated with ridging intensity measurements derived from airborne data; and (c) to determine whether under-ice roughness parameters can be estimated from satellite data.

Examine under-ice roughness parameters for geographical and temporal variability to determine quantitatively whether roughness variations can be grouped geographically. Attempt to correlate latest recorded under-ice roughness data with corresponding satellite data of the surface.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0017, UNDERWAY CURRENT/DEPTH MEASUREMENT SYSTEM
J. Pijanowski, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Ocean Survey, Engineering Development Lab., *6001 Executive Blvd., Rockville, Maryland* 20852 (CE1000/86228700)

OBJECTIVE: The objective of this program is to develop a technique that can remotely profile water currents from an underway vessel to a depth of 100 meters.

APPROACH: An engineering model of a pulsed Doppler current sensor system will be developed. A three-phase performance specification will be written for the development of the system. Error analysis and system specification will be conducted in Phase I, fabrication of hardware in Phase II, and testing in Phase III.

PROGRESS: Phase II testing was completed in France. The results were marginal in that high ambient acoustic noise and electrical generator noise contaminated the data. Phase III testing (ship testing) was conducted aboard the Navy Ship Hayes. The data results from these tests will be processed in early FY81.

SUPPORTED BY U.S. Dept. of Commerce, National Ocean Survey, Engineering Development Lab.

5.0018, DATA AUTOMATION - AUTOMATIC METEOROLOGICAL OBSERVING SYSTEM (AMOS IV)
R.R. Reynolds, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Weather Service, Systems Development Office, Equipment Development Laboratory, *8060 13th St., Silver Spring, Maryland* 20910 (8AA8602)

OBJECTIVE: To totally automate the surface weather observation.

APPROACH: Procure subsystem (to reduce in-house design requirements). Develop software to automate basic parameters. Incorporate ceilometer, visibility and present weather sensors.

PROGRESS: Version 1.0 software and hardware running at T&ED. This version processes temperature, dew-point, winds, pressure and visibility, and accepts limited remarks. It does not provide for quality control of the data, however.

SUPPORTED BY U.S. Dept. of Commerce, National Weather Service, Systems Development Office

5.0019, VISITING ASSISTANT PROFESSOR PROGRAM
C.I. Wunsch, Massachusetts Inst. of Technology, School of Science, Dept. of Earth & Planetary Sciences, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (NGT 22-009-900)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0020, CRYOGENIC GAS REPLENISHMENT SYSTEM STUDY
A.S. Carten, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF581760)

AF function - advanced balloon systems (surveillance, reconnaissance, communications, environmental research support). Deficiency or opportunity - present vehicles have limited altitude, duration and payload capabilities. Objective - to develop a system which will make long-duration (approximately 10 days) scientific balloon flights more efficient and cost-effective than at present. How research contributes - this work involves studies and investigations which are expected to lead to the design, fabrication and test of a prototype balloon inflation gas replenishment system. When the ultimate goals of this research are achieved it will be possible for the Air Force to conduct longer-term scientific or operational balloon flights than are practical at the present time. This will enhance the Air Force's mission capability in the areas of environmental and space research, air particle sampling, surveillance and point-to-point communications.

Preliminary studies have shown the feasibility of replacing the heavy ballast systems currently used on long-duration scientific balloon flights with lighter cryogenically oriented gas replenishment systems. A mathematical model will be used to establish basic system parameters and additional studies will be made to determine the optimum method of heat exchange to warm the very cold gas to ambient air temperatures. The end-product of this research will be a final report which will outline recommendations with respect to further development and proof of concept testing.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0021, HIGH ENERGY PLASMA INSTRUMENT
D.A. Hardy, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF249200)

AF function - AF satellite systems operate at synchronous altitudes where charging can occur due to natural causes and may give rise to effects deleterious to the systems. Deficiency - the data base of the high energy plasma present at synchronous orbit is inadequate to accurately describe charging events or to properly relate them to their ultimate cause. Objective - to provide high-time resolution energetic particle sensors for the SCATHA satellite so as to permit, in conjunction with other environmental and engineering experiments aboard the SCATHA satellite, the establishment of specifications which support design criteria for space systems. How research contributes - detailed data on the influx of high energy particles will be available from this satellite and will be analyzed as a function of time, satellite charge, solar illumination and other relevant parameters.

The Magnetospheric Dynamics Branch of the Space Physics Division will provide electrostatic analyzers and solid-state spectrometers for the SCATHA satellite. These instruments will define, on a rapid-time basis, the influx of high energy particles to a geosynchronous satellite. A detailed analysis will be carried out on the data from these sensors in conjunction with data from other sensors on the satellite and other appropriate geophysical parameters.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0022, AUTOMATED AVIATION WEATHER PREDICTION

B.A. Kunkel, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF582990)

AF function - launch and recovery of military aircraft. Deficiency - lack of timely, automated methods of short-range prediction of aviation-critical weather parameters. Objective - to investigate the characteristics of aviation-critical weather parameters such as slant range visibility, low-level wind shear and cloud base height, and to develop and evaluate statisically based objective techniques which predict their behavior over periods ranging from 0 to 3 hrs. How development contributes - the launch and recovery of military aircraft will be less hazardous and more effective, given improved predictions of aviation-critical weather parameters.

Weather data being gathered at the Otis AFB Weather Test Facility (WTF) will be subjected to an extended analysis to determine the temporal and spatial characteristics of slant range visibility, as defined by a multiple sensor array of forward scatter meters (FSM) and transmissometers in a simulated landing zone and from remote towers. Using multivariate statistical methods, such as regression estimation of event probabilities, short-range prediction experiments, initially carried out under task 667010, will be extended to consider the additive contribution of multiple FSM and transmissometer measurements. Consider the additive contribution of multiple FSM and transmissometer measurements. Cloud-base height observations will be gathered for a period of one year from an array of three automated rotating beam ceilometers (RBCs) located at the WTF and near an active runway at Otis AFB. An assessment of the representativeness of closely spaced RBCs observations to automatically specify the required cloud parameters of total sky cover, cloud layer amounts and ceiling will be made. The development and testing of techniques of forecasting baseline cloud base height (or ceiling if appropriate) will be accomplished.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0023, ENCODER/TIMER/DECODER DEVELOPMENT USING CMOS CIRCUITRY FOR STANDARDIZED BALLOON CONTROL

H. Laping, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF580620)

AF function - advanced balloon systems for surveillance, reconnaissance, communications and environmental research. Deficiency -the existing standard instrumentation system for balloon flight-control and data gathering functions is no longer adequate for many flights due to the ever-increasing number and complexity of the scientific payload requirements. Objective - design, develop and test an improved encoder/timer/decorder, for the purpose of increasing both the reliability and flexibility of the AFGL standardized balloon flight instrumentation system. How research contributes - with a standard flight control system that has been advanced to the state-of-the-art, the current need for special control systems on a majority of balloon flights will be reduced. This will result in both dollar and manpower savings.

A 16-channel variable speed data encoder and an 18-channel command decoder incorporating a precision flight-safety timer will be designed, breadboarded and tested in-house by AFGL personnel. From the in-house design final flight models will be developed and tested under contract. The final units will be integrated into a standardized AFGL balloon flight instrument and flight-tested by AFGL personnel. A technical report will be the end-product of the in-house work unit.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0024, ANALYSIS OF ATMOSPHERE EXPLORER AND S3-1 DATA

F.A. Marcos, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF581210)

AF function - airborne surveillance, target acquisition. Deficiency or opportunity - atmospheric density variations with time and space cannot be accurately predicted. Objective - to analyze density results from the AE/S3 accelerometer data base and to relate them to coordinated measurements of composition and other structure properties for the development of an improved atmospheric model. How research contributes - an improved empirical density model will be developed for the altitude region 140-250 km. More accurate density models permit improved surveillance capability and will result in less frequent recalculations by ADCOM of the orbital elements of satellites, resulting in a considerable savings in computer costs and improved operational capability.

The accelerometer density data base will be expanded to include all available AE-C, -D, -E and S3-1 data. Correlative composition and temperature data will also be included where available. Studies will be made to determine properties of atmospheric variability related to (a) longitude, (b) geomagnetic activity, and (c) local time. These results will be used to complement and extend the preliminary model developed using AE-C data.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0025, AURORAL SCINTILLATION MODELLING STUDIES

J.P. Mullen, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF580910)

AF function - communications/navigation. Deficiency - signal fading, range errors. Objective - to model ionospheric parameters and predict deficiencies. How research contributes - develops and tests predictive models of ionospheric scintillation based on actual data to be used by AWS. Model will include effects of elevation and frequency scaling.

Using actual data from Goose Bay and Narsaq Point, models will be constructed using geophysical parameters to predict scintillation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0026, AURORAL AND AIRGLOW INFRARED STRUCTURE

R. Nadile, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF584470)

AF function - infrared surveillance technology. Deficiency -insufficient knowledge of infrared background structure which can degrade surveillance systems. Objective - to investigate the spatial and temporal variability of infrared atmospheric emissions in auroral and disturbed airflow environments. How research contributes - accurate modeling of auroral and airglow clutter will provide a background predictive capability necessary for the design and optimization of IR surveillance systems.

Field measurements obtained by rocket, aircraft, satellite and ground-based sensors will be analyzed to determine the magnitude, scale size and frequency of spatial and temporal structure in aurora and airglow for different viewing geometries. Visible measurements, which comprise the largest fraction of the present data base, will be extrapolated to the infrared based on our current understanding of the species and mechanisms responsible for atmospheric structure. In FY80, results from a dedicated infrared structures rocket experiment (ELIAS, ILIR7DZA) will be incorporated into the evolving model. This effort will also be coordinated with work units 76701008, aircraft measurements of infrared spatial structure, and 2310G412, auroral IR spectra.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0027, SOLAR PARTICLE EVENT TIME-INTENSITY PROFILE PREDICTION

D.G. Smart, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF584720)

AF function - survivability, solar effects on satellite operations, detection and surveillance systems, and communications. Deficiency -inability to satisfactorily and accurately predict the

solar particle events that affect the aerospace environment in which USAF systems operate. Objective - to develop techniques for predicting the time-intensity profiles of various components of solar particle events. How research contributes - significant solar particle events interfere with a number of satellite-borne surveillance and detection systems and also communication systems. The ability to predict the time-intensity profile of solar particle events enables a forecast center to predict when an event may exceed the interference threshold for a specific system, how severe the interference will be and how long the event will exceed the interference threshold.

The energetic solar particle data acquired under a previous work unit as well as significant recent solar particle event data will be used to develop models of solar particle events. The models of the events will be used as predictors of other events, and then the model predicted time-intensity profiles compared with actual data to identify major dificiencies.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0028, UV ELECTRON AND PROTON FLUX MEASUREMENTS IN THE AURORAL E LAYER

R.A. Van Tassel, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF584090)

AF function - transionospheric ranging and communications, remote ionospheric monitoring. Deficiency - present state-of-the-art in relating natural optical emission to the electron density profile is not understood well enough to permit remote satellite monitoring of the auroral oval. Objective - in situ measurements with rockets of uv, electron and proton fluxes. How research contributes - provides direct measurements of atmospheric parameters to correlate with other measurements and computer codes being generated in the Auroral E program.

The approach is to use sounding rockets to measure the following parameters in the auroral E layer: 1) electron flux and differential energy distributions from 1 eV to 20 KeV, 2) proton flux and differential energy distributions from 5 KeV to 60 KeV, and 3) volume emission rates and total column emission rates from atomic oxygen at 5577 Angstroms, 2972 Angstroms and 1356 Angstroms, from neutral nitrogen in the LBH bands and 2nd positive bands, from ionized nitrogen at 3914 Angstroms, from hydrogen beta at 4861 Angstroms, and from the nitrogen dioxide continuum around 5070 Angstroms. All of the measurements will be made from a single rocket payload in the altitude range between 90 and 180 km.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0029, NAVY ENVIRONMENT - SYNTHETIC APERTURE RADAR SENSING OF THE OCEAN SURFACE

R.A. Shuchman, Environmental Research Inst. of Michigan, *P.O. Box 8618, Ann Arbor, Michigan* 48107 (DN675694; N00014-76-C-1048)

All-weather remote assessment of coastal wave spectra is desirable for a variety of naval and Marine Corps operations; it may also provide clues on underwater topography. Only the synthetic aperture radar offers sufficient resolution for this task. Theoretically, it is not known how this will work because the target moves but it has been shown that in many cases useful results can be obtained.

Contractor will use his own SAR data base for testing developed imagery models, develop a technique to accurately measure surface roughness by SAR, further develop direct Fourier derivation techniques for wave spectra and apply enhancement techniques. Application of results so far achieved under this contract to problems of Navy investigators, and participation in upcoming information SAR-using experiments, will be prepared.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0030, METHODS OF GEOBOTANICAL PROSPECTING - GRADUATE STUDENT RESEARCHERS PROGRAM

D.M. Gates, University of Michigan, Ann Arbor Campus, School of Literature Science & the Arts, Dept. of Botany, *Ann Arbor, Michigan* 48104 (NGT 23-005-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0031, THE EFFECT OF MOISTURE STRESS ON MULTISPECTRAL RADIATION FROM AGRICULTURAL CROPS

B.L. Blad, University of Nebraska, Lincoln Campus, School of Agriculture, Dept. of Agricultural Engineering, *Lincoln, Nebraska* 68508 (NGT 28-004-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

5.0032, REMOTE ICE THICKNESS AND STRENGTH DETERMINATION

A. Kovacs, U.S. Dept. of Defense, Army, Corps of Engineers, Cold Regions Research & Engineering Lab., *P.O. Box 282, Hanover, New Hampshire* 03755 (DA0C8144)

The technical objective is to evaluate remote sensing techniques for detection of ice thickness and strength. The purpose is to provide methodology which can be used by the Army in the field for determining if an ice sheet (river, lake or sea) will support tactical vehicles. Information will be transferred to other government agencies.

The approach will be to evaluate electromagnetic methods for measuring ice thickness and physical properties which can be used to evaluate the bearing capacity of a desired ice crossing by military vehicles. This will include the evaluation of platforms needed to transport the remote sensing equipment. From this evaluation, system concepts for determining, by remote techniques, the trafficability of an ice sheet will be developed.

SUPPORTED BY U.S. Dept. of Defense, Corps of Engineers, Cold Regions Research & Engineering Lab.

5.0033, OPTICAL/ELECTROMAGNETIC CHARACTERISTICS OF COLD REGIONS MATERIALS

H.W. O'Brien, U.S. Dept. of Defense, Army, Corps of Engineers, Cold Regions Research & Engineering Lab., *P.O. Box 282, Hanover, New Hampshire* 03755 (DA0D8152)

To support the 'DOD Plan for Atmospheric Transmission Research and Development' and the DARCOM program relating to 'The Use of Realistic Battlefield Conditions Throughout the Army' by providing fundamental information concerning (a) the electro-optical characteristics of snow cover as a target background and of airborne snow and cold fog as obscuring aerosols, and (b) the dielectric properties of snow, ice and frozen soil surfaces under various cold regions conditions.

Study the spectral reflectance and transmission characteristics of snow and the effect of fog/snow obscuration. Interpret results of laboratory and field measurements. Determine in situ dielectric properties in the VHF and UHF bands of snow, ice and frozen soils through measurements of ground-wave wave-tilt and field strength attenuation. Disseminate results to users to provide a basis for improved design and performance of materiel. Foreign state-of-the-art is being considered.

SUPPORTED BY U.S. Dept. of Defense, Corps of Engineers, Cold Regions Research & Engineering Lab.

5.0034, NAVY ENVIRONMENT - ATMOSPHERIC WATER VAPOR

T. Ashworth, South Dakota School of Mines & Technology, School of Engineering, Dept. of Physics, *Rapid City, South Dakota* 57701 (DN323084)

To fill the need for an expendable, in situ humidity sensor for very low atmospheric humidity to be used in conjunction with the development of remote sensing tecniques for water vapor in the atmosphere. The aim of this research is to attack the complex problems involved in the development, testing,

calibration and modification of such sensors. The research will benefit Navy efforts to cope with the refractive index problems that hamper modern weaponry.

The present research effort involves determination of the optimum constructional geometry, film thickness and film purity of a silicone oxide, low humidity sensor. Also included is an attempt to model the response time of humidity-sensitive devices considering the influence of diffusion on the film surface. A study is being made of the problem of thermodynamic equilibrium between the film surface and the air stream. New sensors are being tested down to a dew-point of -70 degrees C.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0035, GRADUATE STUDENT RESEARCHERS PROGRAM

L.A. Taylor, University of Tennessee, Knoxville Campus, School of Liberal Arts, Dept. of Geological Science, *W. Cumberland Ave. S.W., Knoxville, Tennessee* 37916 (NGT 43-001-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

5.0036, GRADUATE STUDENT RESEARCHERS PROGRAM

M.A. Dungan, Southern Methodist University, School of Humanities & Sciences, Dept. of Geological Sciences, *Hillcrest & University, Dallas, Texas* 75222 (NGT 44-007-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

5.0037, SHEARING OF ATMOSPHERICALLY DRIVEN NEAR-SHORE DYNAMICS

D.W. McGrail, Texas A & M University, College Station Campus, School of Geosciences, Dept. of Oceanography, *College Station, Texas* 77843 (NGT 44-001-801)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Jet Propulsion Lab.

5.0038, COMMUNICATIONS - DETERMINING THE EARTH'S MAGNETOSPHERIC STATE FROM COSMIC RAY ANISOTROPIES

J.T. Ely, University of Washington, School of Arts & Sciences, Dept. of Geophysics, *Seattle, Washington* 98105 (DN775381; N00014-77-C-0392)

Geomagnetic storms degrade or disrupt naval communications, navigation, and surveillance systems. There is indirect evidence that connection of a southward interplanetary magnetic field to the geomagnetic field may trigger magnetic storms either through increased entry of solar wind particle flux, stimulated field-line reconnection, or some combination. This experiment will measure the change in geomagnetic configuration due to connection by detecting anisotropies in the galactic cosmic ray flux. If successful, short-term forecasts of geomagnetic activity could be possible. Periods of geomagnetic activity are associated with spacecraft charging events that have caused permanent or temporary spacecraft damage, possibly due to increased solar wind entry.

Data from the ONR-305 experiment on the S3-4 satellite will be analyzed and correlated with the interplanetary magnetic field, geomagnetic indices, and spacecraft charging events.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0039, JOINT USE OF FACILITIES FOR ESTABLISHING OPERATIONAL CAPABILITIES OF WASHINGTON STATE AGENCIES & MUNICIPALITIES IN USE OF IMAGE PROCESSING

L.T. Krebs, Washington State University, School of Arts & Sciences, Dept. of Environmental Science, *Administration Bldg., Room 101, Pullman, Washington* 99163 (NCA 2-840001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, TERRAIN VISUAL CUE REQUIREMENTS FOR FLIGHT SIMULATION

G.H. Buckland, U.S. Dept. of Defense, Air Force, Human Resources Lab., *Williams Air Force Base, Chandler, Arizona* 85224 (DF223200)

1. To investigate the relative utility of different types of terrain visual cues for low altitude visual flight simulation. 2. To evaluate the relative importance of the trade-offs between the limited number of possible visual cues. 3. To develop the optimum visual scene for ASPT, for use in other research and training which require low altitude visual flight simulation.

Dual phase experiments will be used. Experienced pilots will participate in either the landing or NOE studies. The general approach will be to vary the types of visual cues available to the pilots and to study the effects of these cues upon their subsequent performance.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0002, E-3A MISSION SIMULATOR (MS) FOT AND E PHASE II

W.H. Nelson, U.S. Dept. of Defense, Air Force, Human Resources Lab., *Williams Air Force Base, Chandler, Arizona* 85224 (DF224260)

Specific objectives requiring AFHRL support include: assess the psychological fidelity and the ECM simulation fidelity of the MS, assess the instructional features of the MS, assess the capability of the simulation support function, assess the human factors engineering of the simulation support capsule, assess the training capability of the MS.

AFHRL/FTR will provide on-site evaluation of the capability of the instructional and simulation support features in the capsule to provide a functional environment for training mission crew tasks. This includes data collection, processing, and analysis. AFHRL/SM will process computer cards which will be mailed by the test team once per month and will provide quarterly and final analysis summaries to include, but not be limited to, deficiencies and conclusions/recommendations. AFHRL will also provide written summaries (interim and final) to include conclusions, recommendations and potential deficiencies.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0003, CHANGES IN CORTISOL AND ANTIDIURETIC HORMONE DURING INDUCED MOTION SICKNESS IN SQUIRREL MONKEYS

R.A. Fox, California State University & Colleges, San Jose State University, School of Humanities & the Arts, Dept. of Psychology, *Washington Sq., San Jose, California* 95192 (NCC 2-72)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0004, USMC AIR NAVIGATION TRAINING

O.A. Larson, U.S. Dept. of Defense, Navy, Personnel Research & Development Center, *San Diego, California* 92152 (DN797567)

To develop a program for training Marine Corps fixed-wing pilots in navigation and target acquisition techniques that will allow them to operate at low altitudes over unfamiliar terrains.

Map interpretation, terrain analysis, and target acquisition techniques will be developed and evaluated. Materials and methods will be field-tested using cinematic and sensor simulation support. Flight navigation problems specific to USMC operational requirements will be analyzed and recommendations forwarded.

SUPPORTED BY U.S. Dept. of Defense, Navy, Personnel Research & Development Center

6.0005, GRADUATE STUDENT RESEARCHERS PROGRAM
J.A. Smith, Colorado State University, School of Forestry & Natural Resources, Dept. of Forest & Wood Sciences, *Fort Collins, Colorado* 80523 (NGT 06-002-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

6.0006, IMPROVEMENT OF VISION AND ORIENTATION UNDER WHITE-OUT CONDITIONS
J.A. Kinney, U.S. Dept. of Defense, Navy, Naval Submarine Medical Research Lab., Vision Div., *Naval Submarine Base, Groton, Connecticut* 06340 (DN977590)

Military operations in the cold regions of the world are frequently hindered by loss of visibility due to weather conditions. 'White-outs' refer to a uniform visual field of white with no horizon; this may be caused by fogs, ice-fogs, snow or a unique polar condition in which light is reflected back and forth between snow and cloud cover. Whatever the cause, the potential dangers are severe - interference with the mission, loss of orientation, and possible loss of life. While 'staying-put' is the only recommended action in white-out, it could be disastrous for some military or medical missions. The goal of this work unit is the development and testing of alternate procedures - techniques or devices which might assist individuals in finding their way during white-out.

A variety of techniques, devices and training procedures will be tested for effectiveness in restoring vision during white-out, first in laboratory simulations and then in field conditions. The techniques, ranging from the use of lenses and goggles to orientation procedures, were selected since understanding of the physiology of the visual system suggests they might be effective.

SUPPORTED BY U.S. Dept. of Defense, Naval Medical Research & Development Command, National Naval Medical Center

6.0007, EVOLUTIONARY RELATIONSHIPS AMONG BACTERIA - THERMOPHILES AND MESOPHILES
E.J. Johnson, Tulane University of Louisiana, School of Medicine, Dept. of Microbiology & Immunology, *1430 Tulane Ave., New Orleans, Louisiana* 70112 (NCA 2-800001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0008, CARDIOVASCULAR CIRCADIAN RHYTHMS
F.M. Sulzman, State University of New York, Binghamton Campus, Graduate School, *Vestal Parkway, Binghamton, New York* 13901 (NGT 33-188-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0009, BIOLOGICAL MATERIAL PROPERTIES AND BIODYNAMIC MECHANISMS
I. Kaleps, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF320830)

It is of utmost importance in the development of aerospace manned systems to be able to predict the injury potential to the human occupant of such systems during the design phase. Various approximate analytic and computer modeling techniques have been developed for this purpose; however, the proper implementation of these methods requires a detailed knowledge of the structure, dynamic response and injury mechanisms of the human body. It is the purpose of this effort to assimilate such data and reduce them to the proper form for inclusion in various highly sophisticated biodynamic body models. This will allow predictions of human body response to various and complex mechanical force applications and respective assessments of injury potential.

Analytic and computer model descriptions of the function, structure and dynamic behavior of human biodynamic subsystems will be developed. These studies will be paralleled by investigations of spinal material properties and structure as well as ligament, bone and other tissue properties, infrasound interaction with respiratory function and internal forces and ranges of motions of joints. Efforts will be made to integrate the subsystem characteristics into more encompassing models describing segmental or total body response.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0010, VCASS LABORATORY SYSTEMS DESIGN/INTEGRATION
D.F. Kocian, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321150)

To perform the systems analysis and design of the overall visually coupled airborne systems simulator (VCASS), including the visually coupled systems (VCS) components (helmet-mounted sight/helmet-mounted display), scene/graphics generators, and crew station, computational, software data base subsystems. To specify the configuration of VCS and scene generation components to be developed on contract. To integrate these components into a laboratory systems demonstration of the VCASS concept. The ultimate product of this program will be an extremely cost-effective, high fidelity visual scene simulation capability to be utilized for engineering design as well as training applications. This effort supports AFSC development goals TC-2, TC-4, TC-5, MS-4, and TN-1.

The overall VCASS effort will exploit the unique capabilities of the visually coupled system (helmet-mounted sight/display) technology in order to provide a self-contained ground/airborne man-in-the-loop visual display scene simulator for performing man-machine interface design and engineering of cockpit control/display subsystems. Initially, an interim laboratory demonstration capability will be developed by integrating existing helmet-mounted sight and display components into a cockpit mock-up with an interface to a programmable symbol generator. A demonstration will then be performed to show the conceptual use of the VCS as a hemispherical head-up display. Psychophysical studies will be conducted to determine the critical VCASS design factors such as the required instantaneous field-of-view of the helmet-mounted display, display update rate, angular resolution/update rate of the helmet-mounted sight and trade-off between monocular versus binocular display viewing. As a result of these findings, advanced VCS components will be specified and developed through separate contractual efforts. Simultaneously, a comprehensive systems analysis and system design will be performed for developing an advanced laboratory demonstration of the VCASS concept.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0011, AFTI/F-16 ACCELERATION PERFORMANCE EVALUATION
R.E. Van Patten, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF326410)

The upcoming generation of six degree-of-freedom (6DOF) aircraft typified by the AFTI/F-16 will subject pilots to new acceleration environments by combining 6DOF capabilities with those of conventional aircraft. The objective of this work is to quantify the effects of these 6DOF-generated acceleration environments on pilot performance in air-to-air and air-to-ground combat, and to investigate principles for new seats and restraints suitable for use in 6DOF aircraft. The early work in this effort will be focussed on critical AFTI/F-16 restraint problems which must be quantified by February 1, 1980 in order to meet airframe and pilot-vehicle interface (PVI) deadlines as scheduled by the AFTI/F-16 ADPO (AFFDL/FI) and the contractor, General Dynamics. A memorandum of agreement between AFFDL/FI and AFAMRL/BBS has been approved to cover current and out-year research in this area.

The general approach will involve man in the (control) loop experimentation using the AFAMRL dynamic environment simulator (DES), which is a multi-gimballed human centrifuge. Research in FY80 will concentrate on AFTI/F-16 restraints and biodynamic cross-coupling between rudder pedals and the side-stick controller induced by the lateral acceleration

forces commanded by rudder inputs. Subsequent experimentation will advance into simulation of air-to-ground and air-to-air engagements using both conventional airframe motions compared to 6DOF aircraft capabilities. Theoretical work will be merged into these experiments in order to exploit previous work in the development of mathematical describing functions of pilot tracking performance.

SUPPORTED BY U.S. Dept. of Defense, Aerospace Medical Research Lab., Biodynamics & Bionics Div.

6.0012, EFFECTS OF HIGH ACCELERATION-INDUCED BRAIN BLOOD FLOW DISTRIBUTION ON HUMAN OPERATOR PERFORMANCE
J. Yoder, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF322450)

To measure the effect of Gz acceleration on cerebral blood flow rate and the impact of this stress-response interaction on human operator performance. To evaluate the relationships of cerebral blood flow values determined by radioactive microsphere distribution to cardiac output. To determine the efficacy of cerebral blood flow rate manipulation in terms of performance enhancement. This technology will define those physiological criteria which contribute to the optimization of human performance.

The effect of acceleration on intracerebral blood flow distribution will be determined by the injected radioactive microsphere technique. The rationale of indirect assessment of cerebral perfusion on the basis of cardiac output determination will be tested. Cerebral blood flow distribution as determined by radioactive microsphere dispersion will be correlated with simultaneous dye dilution cardiac output determinations in animals. A broad spectrum of cardiac output values will be induced by provocative measures such as cardiac pacing and acceleration. Modification of the behavioral effects of acceleration-associated cerebral blood flow rate by a variety of flow augmentation techniques will be delineated in instrumented, performance-trained animals.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0013, EQUILIBRIUM DEPRIVATION AND ITS EFFECTS ON THE NERVOUS SYSTEM
H.B. Hartman, Texas Tech University, School of Arts & Sciences, Dept. of Biological Science, *P.O. Box 4340, Lubbock, Texas* 79409 (NGT 44-011-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0014, ANALYSIS OF CAREER MOTIVATION-CAREER POTENTIAL INDEX
E. Boyle, U.S. Dept. of Defense, Air Force, Human Resources Lab., *Lackland Air Force Base, San Antonio, Texas* 78236 (DF233720)

The objectives of this effort are as follows: (1) to develop a data base for a longitudinal study of career motivation, (2) to determine changes in career motivation during first-term and the reasons for those changes, (3) to identify factors related to positive career motivation, and (4) to explore the feasibility of developing a career potential index.

A large sample (approximately 30,000) of NPS airmen will be administered a biographical/attitudinal survey at the 12-, 24- and 36-month points of their initial tour. Distribution and regression analyses, and chi square analyses will be accomplished to track career motivation and predictability of career intent/career decision.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0015, MAJCOMS AND BASE-LEVEL SUPPORT
J.A. Boydstrun, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF322000)

The objective of this work unit is to provide direct support to requestors for assistance through utilization of the existing aerospace medicine technology data base, the expertise of the Clinical Sciences Division staff, and where required, the expertise of USAFSAM resources outside of the Clinical Sciencies Division.

The approach to be utilized will involve initial division staffing of the specific request to determine the full spectrum and scope of the endeavor, the individuals to participate in the evaluation and the assignment of opr to a specific Clinical Sciences Division scientist. All available division resources will be subject to utilization at one time or another, including the various medical information files, the accumulated patient evaluation records from the aeromedical consultation service, and also the accumulated years of aeromedical experience and judgment. Anticipated products will be a summary of evaluations and analyses which may be in a simple letter reply, a USAFSAM technical report, or published paper. This is a new start work unit for fiscal year 1977.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0016, USAFSAM CARDIOVASCULAR DISEASE FOLLOW-UP STUDY CLINICAL EVALUATION
R.S. Dryden, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF323070)

Provide clinical evaluation in a standardized environment to identify the earliest signs of occult or latent coronary artery disease and relate these to the 20-plus years of risk factor data which have been accumulated on this selected population. This information would be assimilated into refined selection and retention criteria for officer candidates in order to select and retain those least likely to suffer from premature cardiovascular disease.

Perform a thorough examination at USAFSAM to evaluate each subject's cardiovascular system and all risk factors, including all applicable medical and laboratory tests. Devote special attention to motivating subjects, both active and inactive, to participate in the study. Collate the data obtained from multivariate analysis of risk factors. Apply the results to the problems of (a) improved selection of candidates for pilot training, and (b) early identification of individuals prone to heart disease. This work was previously documented under work units 7930-07-05 and 7755-14-04.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0017, NEUROPSYCHOLOGICAL SEQUELAE AND PATTERNS OF DEFICIT IN USAF AIRCREW MEMBERS WITH CLOSED HEAD INJURY
R.D. Wheatley, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF324320)

To establish base rates and a collection of descriptive data regarding neuropsychological and other psychometric sequelae and patterns of deficit in USAF aircrew members with closed head injury.

Compare the psychometric test performances of 50 closed head-injured aircrew with those of 50 non-head-injured matched aircrew controls. Objective neuropsychological, intellectual, and personality measures are used. Inter-group as well as intra-individual comparisons will be carried out so that inferences derived from levels and patterns of performance can be developed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0018, ESTABLISHMENT OF STANDARDIZED EXERCISE STRESS TESTS FOR DETECTION OF CORONARY ARTERY DISEASE IN AIRCREW MEMBERS
R.A. Wolthuis, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF321620)

The presence of coronary artery disease (CAD) significantly affects the patient's aeromedical disposition. Detection of

CAD is thus an important continuing effort, and the use of exercise stress testing is the cornerstone of this effort. This work unit is designed to develop new exercise stress test methods, to implement and evaluate them at USAFSAM, and to promote the use of successful methods in the field.

The approach will consist of several concurrent tasks: 1) treadmill stress ECG reproducibility will be investigated in patients with and without CAD, and the effect of propranolol pretreatment on subsequent ECG response will be studied; 2) software will be developed, tested and implemented for on-line acquisition and analysis of treadmill ECG data; 3) treadmill ECGs from the past several years will be reviewed to see if patterns emerge that separate those with and those without CAD. These patterns will be correlated with other known risk factors.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, STABLE BOUNDARY APPROXIMATIONS FOR DIFFERENCE METHODS FOR COMPRESSIBLE FLUIDS

J. Oliger, Stanford University, School of Humanities & Sciences, Dept. of Computer Science, *Stanford, California* 94305 (NCA 2-745004)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

7.0002, A VECTORIZED MULTIGRID FOR THE CAUCHY-RIEMANN EQUATIONS

J.W. Thomas, Colorado State University, School of Natural Sciences, Dept. of Mathematics, *Fort Collins, Colorado* 80523 (NCA 2-165001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

7.0003, URBAN AREA CHANGE DETECTION PROCEDURE WITH REMOTE SENSING DATA

J.R. Jensen, University of Georgia, Franklin College of Arts & Sciences, Dept. of Geography, *Athens, Georgia* 30601 (NAS 5-26129)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

7.0004, CLIMATOLOGICAL AND STATISTICAL DATA ANALYSIS

L. Burke, Regis College, Undergraduate School, Dept. of Mathematics, *235 Wellesley St., Weston, Massachusetts* 02193 (DF279870; F19628-76-C-0009)

AF function - design of aerospace systems. Deficiency - Require meteorological data in greater detail and complexity for adequate design and aerospace operational doctrine. Research - methods of synthesizing and presenting available information. How research contributes -describes the variability of atmospheric parameters in formats required in Air Force design and operation. Objective - the objective of this program is to perform mathematical and statistical operations on all types of meteorological observational data. This includes analysis and evaluation of meteorological records, rocket and balloon flight data, aircraft and field test data.

Apply statistical and meteorological theory along with computer techniques to the climatic record.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

7.0005, THREE-DIMENSIONAL TRANSONIC FLOW ANALYSIS

G.E. Chmielewski, McDonnell Douglas Corp., *P.O. Box 516, St. Louis, Missouri* 63166 (DF043730; F44620-76-C-0096)

AF function - advanced aerospace vehicles. Opportunity - improved flow-field prediction methods in the transonic regime. Objective -develop a computational program which will permit calculation of steady, inviscid transonic flow-fields around complex three-dimensional bodies. How research contributes - development of this technique will help reduce present requirement for extensive and expensive wind tunnel testing.

A method will be developed for the solution of the transonic full potential equation using the finite difference analog to the governing differential equation. A rectangular computational grid derived from either Cartesian or skewed coordinates will be used and complicated global mappings will be avoided. The exact surface boundary conditions will be enforced on embedded curved surfaces using interpolation among surface-adjacent points.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0006, RANDOM CHOICE METHODS AND CORRESPONDING ONE-SIDED SCHEMES FOR HYPERBOLIC CONSERVATION LAWS

A. Harten, New York University, Washington Square & University College of Arts & Sciences, Dept. of Mathematics, *421 1st Ave., New York, New York* 10012 (NCA 2-525001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

7.0007, IMPROVING CONVERGENCE TO THE STEADY STATE

D.C. Jespersen, Oregon State Higher Education System, Oregon State University, School of Science, Dept. of Mathematics, *126 Agricultural Hall, Corvallis, Oregon* 97331 (NCA 2-586001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

7.0008, AN ANALYSIS OF THE LOGAIR DISTRIBUTION SYSTEM USING OPTIMIZATION PRINCIPLES

J.L. Kennington, Southern Methodist University, Graduate School, Dept. of Operations Research, *Hillcrest & University, Dallas, Texas* 75222 (DF046150; AFOSR-77-3151)

AF function - to administer the LOGAIR air freight network that provides the equipment and supplies required by the major USAF installations. Deficiency - the two civilian carriers make no routing or scheduling determinations. This is done by personnel at AFLC, using methods based on experience and certain estimations. The result is an arrangement that is almost surely far from best. Objective - to bring some mathematical theory of scheduling and integer programming to bear on the problem to increase the amount of freight transported or to decrease the cost of the transportation operation. How work contributes - the work would be the only theoretical effort that addresses this particular problem. Any improvement, even if not the optimum solution, would result in cost savings of millions of dollars to the Air Force.

A combination of improved interfacing among routes, better scheduling, and alternative aircraft assignments matched to flow requirements, would significantly alleviate the present deficiencies in costly, abnormally long 'pipeline' times. The methods to be used are part of the science of mathematical programming.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0009, DEVELOPMENT OF SOFTWARE FOR SYNTHETIC APERTURE RADAR (SAR) DIGITAL DATA PROCESSING
C.R. Griffin, University of Texas, Austin Campus, Applied Research Lab., *200 W. 21st, Austin, Texas* 78712 (NAS 9-16104)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, INVESTIGATION OF LASER ACTION IN MOLECULES WITH INDUCED DIPOLE AND WEAK DIPOLE MOMENTS (TMP162)
W.B. McKnight, University of Alabama in Huntsville, School of Science & Engineering, Dept. of Physics, *Huntsville, Alabama* 35807 (DA0G2520; DAAH01-80-C-0210)

Develop new high power laser concepts for future Army application. Experiments leading to lasers based on homonuclear diatomic molecules will be performed.

A theoretical investigation and analysis, numerical calculations, and experiment design and investigation on vibrational transitions in molecules having no intrinsic dipole moment or only a very weak one shall be carried out to develop an induced or weak dipole moment molecular laser. The case of molecules with induced dipole moments, in which an electric field is used to induce the dipole, shall be explored and calculations performed to establish operating conditions which will yield laser action. Calculations shall be based on H2. Stimulated emission cross-sections and inversion densities required for laser threshold shall be calculated. An experiment shall be defined to demonstrate feasibility of the induced dipole laser.

SUPPORTED BY U.S. Dept. of Defense, Missile Command, Directed Energy Directorate

8.0002, SURVEILLANCE - MULTIPHOTON DISSOCIATION OF MOLECULAR IONS
J.R. Peterson, S R I International, Molecular Physics Center, *333 Ravenswood Ave., Menlo Park, California* 94025 (DN775004; N00014-76-C-1035)

In this work the multiphoton dissociation of positive and negative ions is being studied. These processes are important to the naval areas of propagaton of high intensity laser beams and of the future applications of lasers to chemical processing and isotope separation.

The multiphoton dissociation of positive and negative ions such as SF(6)(negative), CF(3)I(positive) and CF(2)Cl(2)(positive) is being studied. The fragment identity, kinetic energy spectrum, and dependence of multiphoton dissociation on frequency and energy are being studied.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

8.0003, ULTRALOW TEMPERATURE PHYSICS
R.E. Packard, University of California, Berkeley Campus, School of Letters & Science, Dept. of Physics, *Berkeley, California* 94720 (DMR79-25098)

Research supported under NSF grant No. DMR-7682934 will be continued and extended. This research encompasses two broad areas: the study of vortex dynamics in superfluid helium-four by means of vortex photography and ultra-low temperature research on the B phase of helium-three. The research on vortex lines is directed toward understanding the detailed dynamics of simple rotating superfluid systems using direct photography and time-lapsed movies. The research concerned with helium-three is multifaceted and includes experiments on critical currents, fourth sound, dielectric constant anisotropy, orbital ferromagnetism and the fountain effect.

This is the first year of a two-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0004, A THEORETICAL STUDY OF PLASMA PHYSICS
B.D. Fried, University of California, Los Angeles Campus, School of Letters & Science, Dept. of Physics, *405 Hilgard Ave., Los Angeles, California* 90024 (PHY77-12873 A03)

Research in theoretical plasma physics initiated under NSF grant PHY77-12873 will be continued. Several fundamental problems in the physics of plasmas (collections of electrically charged particles) are being attacked using both analytical and numerical techniques. Since non-neutral plasmas (consisting almost entirely of electrons) have been stably confined by a combination of cylindrically symmetric electric and magnetic fields for times larger by 100 million-fold than the escape time for a particle in the absence of an electric field, they provide an excellent test bed for many topics in basic plasma theory. The general dynamics and thermodynamics of such plasmas, including the character of the particle orbits, the effects of self-consistent electrostatic forces, and the role of adiabatic invariants in the behavior of the plasma are being studied. The relationship between the important and perplexing phenomenon of anomalous heat transport in plasmas and the magnetic fluctuations observed in experiments at UCLA and elsewhere is also being investigated. A new method of integrating plasma equations of motion over long times using the technique of discrete Hamiltonian mapping equations has been initiated, which should allow certain computer simulations of plasmas to be much more rapid. Finally, a correct kinetic theory of wave propagation in the classic configuration of a cylindrical plasma in a sheared magnetic field (one whose direction changes as one moves across the field) is being developed.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Physics

8.0005, TUNABLE SOLID-STATE LASERS USING DIVALENT RARE-EARTH IONS
R.K. Chang, Yale University, School of Engineering, Dept. of Engineering & Applied Science, *206 Elm, New Haven, Connecticut* 06520 (DF049910; AFOSR-77-3433)

AF function - the Air Force is seeking tunability in solid-state lasers for optical communication and electronic warfare, including jamming. Opportunity - substituting tunability in solid-state lasers for tunability in liquid dye lasers over certain optical frequency ranges. In general, the former are more convenient than the latter for AF uses. Objective - investigate the feasibility of attaining lasing in the optical frequency range using divalent rare earth ions instead of the usual trivalent ions and employing homogeneously broadened upper energy levels to attain tunability. How work contributes - success of project will broaden availability of tunability frequency ranges for solid-state lasers.

Initially the laser involves the divalent rare-earth ion Eu in a chloride crystal host (e.g., CaCl2, BaCl2, SrCl2) as the material, a transition from the homogeneously broadened upper level in the 4f(N-1) 5D band to the narrow lower energy level in the 4FN configuration, and the pumping of the 4F(N-1) 5D band with a standard, incoherent, flash lamp or a pulsed N2 laser. The former will provide pumping for thick layered lasers and the latter for thin layers. Also, wavelength tuning with a grating reflector will be attempted.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0006, PLASMA RADIATION PHYSICS
J. Davis, U.S. Dept. of Defense, Navy, Naval Research Lab., Plasma Physics Div., *Washington, District of Columbia* 20375 (DN080035)

To develop state-of-the-art electron impact scattering formalisms and computer codes describing the interaction between electrons and complex atoms and ions including the plasma microfield effects.

The collision process will be treated quantum-mechanically. Dressed particle aspects will be considered by replacing the Coulomb potential with a screened potential.

SUPPORTED BY U.S. Dept. of Defense, Naval Research Lab., Material & Rad Science & Tech Directorate

8.0007, ZEEMAN STUDIES OF UNIDENTIFIED ACCEPTOR LEVEL IN EXTRINSIC SILICON
A.S. Edelstein, University of Illinois, Chicago Circle Campus, School of Liberal Arts & Sciences, Dept. of Physics, *601 S. Morgan St., Chicago, Illinois* 60680 (DF057650; AFOSR-80-0092)

AF function - microwave solid-state electronic devices are essential components of Air Force surveillance, electronic countermeasures and communication systems. The development of extrinsic silicon-based infrared detectors is dependent upon the knowledge and control of dopants and impurities. Opportunity - this research should improve the ability to develop detectors for the 3-5 and 8-14 micrometer ranges and large detector arrays. Objective - the objective is to optimize detector performance by controlling the doping level of the residual impurities in silicon, as well as that of the major dopants. How work contributes - this work will help establish improved crystal growth conditions for silicon detector materials.

Photoconductivity measurements in a magnetic field will be made to determine the multiplicity of unidentified acceptor levels in extrinsic silicon with group III acceptors. A consideration of the symmetry will be to help identify the acceptor levels.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0008, DEEP-LEVEL DEFECTS IN SEMICONDUCTORS
S. Sundaram, University of Illinois, Chicago Circle Campus, School of Liberal Arts & Sciences, Dept. of Physics, *601 S. Morgan St., Chicago, Illinois* 60680 (DN875661; N00014-78-C-0732)

The operation of solid-state electron devices used in Navy electronics systems is controlled by the electronic nature of impurity atoms incorporated in the semiconductor materials. Deep-level impurities do not contribute directly to the material conductivity but affect carrier lifetime and recombination proceses. Such impurities and their effects are not understood and must be investigated for improving solid-state devices.

Studies will be made of the electronic properties of deep-level defects in gallium arsenide (GaAs) and indium phosphide (InP) produced by imputities such as chromium and iron. Photoluminescence measurements with and without uniaxially applied stress will be made to deduce the valence states and resultant energy levels of the impurity. Theoretical models based on crystal field theory will be developed to correlate predictions of luminescent intensities and energy of deep levels with the experimental results. Various valence states will be considered, configuration mixed representations of the multi-electron systems will be used, and crystal symmetry models for various possible impurity configurations in the lattice will be included in the analysis.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

8.0009, PROPAGATION OF DISTURBANCES ON THE OCEAN SURFACE - GRADUATE STUDENT RESEARCHERS PROGRAM
O. Phillips, Johns Hopkins University, School of Arts & Sciences, Dept. of Earth & Planetary Sciences, *34th & Charles Sts., Baltimore, Maryland* 21218 (NGT 21-001-980)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Wallops Flight Center

8.0010, REVIEW AND EVALUATION OF PHYSICAL SCIENCES PROGRAM, AFOSR
A.J. Dragt, University of Maryland, College Park Campus, Graduate School, Dept. of Physics & Astronomy, *College Park, Maryland* 20742 (DF018080; F44620-76-C-0074)

AF function - this contract will make available to the directorate of physics specialized research evaluations pertinent to the different disciplines in physics, especially those of primary interest to the Air Force. Deficiency - expertise in all fields of physics is needed and available only through access to investigators in the field. Objective - to permit the directorate to more adequately plan research programs and to assess or interpret the merit of the research. Contribution - as stated above.

This contract will make available to the directorate of physics specialized research evaluation pertinent to the different disciplines in physics, especially those of primary interest to the Air Force.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0011, GRADUATE STUDENT RESEARCHERS PROGRAM
F.B. McDonald, University of Maryland, College Park Campus, School of Arts & Sciences, Dept. of Physics & Astronomy, *College Park, Maryland* 20742 (NGT 21-002-803)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

8.0012, RARE-EARTH LASER MATERIALS
A. Linz, Massachusetts Inst. of Technology, Crystal Physics Lab., *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DN880114; N00014-78-C-0251)

Growth, fabrication and characterization of various fluoride and oxide host crystals with one or more trivalent rare-earth ions as dopants or major constituents.

Host crystals with various dopants to be selected by contract monitor will be grown or purchased. Samples of appropriate size will be fabricated and tested and supplied to NRL.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

8.0013, PHYSICS OF INTENSE CHARGED PARTICLE BEAM
R. Davidson, Massachusetts Inst. of Technology, Plasma Fusion Center, *Cambridge, Massachusetts* 02139 (DN980181; N00173-79-C-0036)

The area of charged particle beam technology is becoming increasingly importat to the Department of the Navy. This program theoretically investigates the equilibrium, stability, transport and radiation properties of intense charged particle beams. The objective of the program is to develop theoretical scaling laws defining the importance of the processes mentioned previously.

Theoretical and computational plasma physics techniques will be applied to the investigation of the stability and transport properties of intense ion beams. The cyclotron maser instability will be investigated in parameter ranges of interest to the NRL gyrotron program. Theoretical studies will be undertaken of non-linear effects as they pertain to microstability behavior and anomalous transport in high-temperature plasmas.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

8.0014, DEFECTS IN SEMICONDUCTORS
C. Penchina, University of Massachusetts, Amherst Campus, School of Arts & Sciences, Dept. of Physics & Astronomy, *Amherst, Massachusetts* 01002 (DN675518; N00014-76-C-0890)

Development of electronic and optical components for naval communications and surveillance systems will require increased understanding of the properties of semiconductors. Understanding of the role of impurities and defects is imperative to the preparation of such materials and to prediction of their behavior in devices and in a radiation environment.

The investigator is using a variety of techniques to investigate the electronic nature of the deep level states in gallium arsenide produced by oxygen and chromium impurities. These techniques include photoionization cross-sections, photo-Hall effect, photocapacitance, and cathodoluminescence measurements. The effects of stress on these measurements are used to deduce defect symmetry properties, and temperature effects are used to deduce relationship of defect state to the band structure of the solid. Photoluminescence spectra having phonon sideband induced structure will be used to determine the magnitude of Franck-Condon shifts. Theoretical studies of the temperature dependence of the energy levels and on photoionization cross-sections will continue. Also calculations will be made on electroabsorption processes and their relation to site symmetries.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

8.0015, MICROSCOPIC THEORY OF QUANTUM FLUIDS AND EXTENDED NUCLEAR SYSTEMS

J.W. Clark, Washington University, School of Arts & Sciences, Dept. of Physics, *4559 Scott Ave., St. Louis, Missouri* 63130 (DMR80-08229)

Research previously supported by DMR78-08552.

A theoretical problem of considerable importance to many subfields of physics is the prediction of the ground-state and low-temperature properties of complex quantum systems, starting from a knowledge of the basic interactions between the constituent particles. In earlier sponsored research, a powerful method (called the method of correlated basic functions) has been developed for microscopic description of the especially challenging and fundamental class of systems in which the interactions between the particles are very strong at short distances. Examples of such systems include liquid helium, atomic nuclei, and the matter inside neutron stars. A comprehensive program of studies aimed at quantitative understanding of the microscopic structure and behavior of these highly degenerate systems will be carried out. Further formal development of the method of correlated basis functions will concentrate on the efficient incorporation of effects due to state-dependent correlations. Specific theoretical predictions will then be derived concerning the normal and superfluid properties of liquid helium-3, nuclear matter, and neutron-star matter, the stability of highly spin-polarized hydrogen and helium systems, and short-range correlations in finite nuclei. The results may be expected to have significant implications in the broader arenas of low-temperature physics, dense-matter astrophysics, and nuclear-structure theory.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0016, EFFECTS OF LARGE AMPLITUDE ION ACOUSTIC WAVES ON THE BEAM PLASMA INSTABILITY

J. Walsh, Dartmouth College, School of Arts & Sciences, Dept. of Physics, *P.O. Box 833, Hanover, New Hampshire* 03755 (DF049590; AFOSR-77-3410)

AF function - operation of high altitude vehicles in a post-nuclear explosion environment, development of electromagnetic weapons, space and ionospheric communications as well as countermeasures demand advanced equipment unavailable to date. Deficiency - present-day information is inadequate to design the aforementioned equipment. Such information may be obtained from experimental and theoretical work on beam-plasma nonlinear interactions. Objective - this project will investigate the effects of large amplitude ion acoustic waves on the beam-plasma instability. Contribution - this work is a part of a comprehensive program on plasma research for the development of an X-ray radiation source for simulation of nuclear weapon effects, the development of advanced electromagnetic weapons (laser and ion beam), the development of space and ionospheric communications and the development of countermeasures.

This project will perform experimental and theoretical research on two beams: a fast electron beam which is propagated in a plasma containing large amplitude short wavelength ion acoustic waves. In this experiment the following processes appear: 1. The beam drives a long wavelength plasma wave unstable. 2. This wave couples its energy strongly to a much shorter wavelength plasma wave. The main objective is to isolate the effect of the large amplitude ion acoustic wave upon the beam-plasma processes of interaction of the relativistic beam with a plasma, specifically the generation of microwave radiation. This may be accomplished by: 1. Stimulated Cerenkov radiation of which considerable evidence exists, and 2. Stimulated Raman-Cerenkov radiation of which there is no experimental evidence. To accomplish the foregoing they will explore: 1. The capability of the basic stimulated Cerenkov oscillator-amplifier, 2. the possibility of driving coupled dielectric resonators and other dielectric structures, and 3. the characteristics of various stimulated Raman-Cerenkov sources.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0017, SPECTROSCOPY OF ALKALI ATOMS TRAPPED IN RARE-GAS MATRICES

L.C. Balling, University System of New Hampshire, University of New Hampshire, School of Liberal Arts, Dept. of Physics, *Durham, New Hampshire* 03824 (PHY80-05511)

This investigation in atomic physics will study the interaction between specific types of atoms as the distance between them (which can be controlled) is held constant. The energy-level structure of alkali atoms trapped in various sites in rare-gas matrices at liquid-helium temperatures will be determined. Pulsed one- and two-step dye laser excitation will be used to locate the excited states; the lifetimes of these states and the wavelength distribution of the luminescence will be observed. Comparisons of the experimental results with theoretical calculations, carried on concurrently, will be made to determine the nature of the trapped sites. The effect of the rare-gas matrix on the energy-level structure of the alkali atoms will be calculated, using the same technique employed to compute alkali rare-gas diatomic potentials.

This is the first year of a 2-year continuing grant, and a continuation of that research previously supported under NSF grant PHY78-05369A01.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Physics

8.0018, NONLINEAR PROCESSES IN PLASMAS

R.M. Kulsrud, Princeton University, School of Engineering & Applied Sciences, Dept. of Astrophysical Sciences, *Box 430, Princeton, New Jersey* 08540 (DF040390; F44620-75-C-0037)

AF function - operation of high altitude vehicles in a post-nuclear explosion environment. Development of electromagnetic weapons, space and ionospheric communications as well as countermeasures demands the fundamental understanding of nonlinear evolution of energy transformations in plasmas. Deficiency - the aforementioned information required for the design of advanced equipment is not available today. Its acquisition may be realized by a well planned theoretical and experimental research program. Objective - this program will investigate nonlinear collective phenomena, such as anomalous transport phenomena, linear wave absorption, and plasma wave turbulence, both in the laboratory and in space. Contribution - this work is a part of a comprehensive program of plasma research for the development of an X-ray radiation source for simulation of nuclear weapon effects, the development of advanced electromagnetic weapons (laser and particle beam), the development of space and ionospheric communications and the development of countermeasures.

This is a theoretical study of nonlinear processes in plasma physics. The proposed topics for study are (1) the drift-wave instability and its relation to magnetic field break-up, (2) convection cells in nonsimple geometries, (3) the maximum rate at which forced magnetic reconnection can proceed, (4) the theory of stochastic orbits in quasi-random magnetic fields and its relation to plasma transport, and (5) the general theory of the ionospheric turbulence. In the study of the drift wave instability, the effect of inhomogeneous magnetic fields will be evaluated. The possibility that reconnection rates based on fluid theory are

much smaller than previous theoretical predictions will be investigated by Kulsrud and Kaw, not only from a theoretical point of view, but from comparison with known experiments in nature and in the laboratory. Perkins will try a new numerical approach to plasma turbulence which involves a separate treatment of the very small scales. This allows the computer to proceed more rapidly with the larger scales. Perkins will continue his treatment of turbulent processes in the atmosphere. Foote and Kulsrud will investigate the plasma dispersion relation making use of new computer techniques.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0019, THEORY OF PHASE TRANSITIONS IN RANDOM SYSTEMS

M.J. Stephen, Rutgers the State University of New Jersey, New Brunswick Campus, School of Arts & Sciences, Dept. of Physics, *Old Queens Bldg., New Brunswick, New Jersey* 08903 (DMR78-10276)

Research previously supported by DMR75-13350.

Theoretical research in condensed matter physics will be carried out. The main emphasis will be on the application of renormalization group methods to phase transitions in random systems. Of particular interest are those systems exhibiting strong randomness near the percolation threshold. Among the topics to be considered will be (a) pure percolation problems, (b) phase transitions in random magnets near the percolation threshold, and (c) the conductivity of random resistor networks and its relation to phonons in a random lattice and spin waves in random ferromagnets.

This research will enhance the understanding of the behavior of an important class of materials, i.e., disordered solids under conditions near a phase transition.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0020, EXPERIMENTAL INVESTIGATION OF ELECTRON LOCALIZATION PHENOMENA IN DISORDERED SYSTEMS

D.F. Holcomb, Cornell University, Ithaca Campus, School of Arts & Sciences, Dept. of Physics, *Ithaca, New York* 14850 (DMR78-10728)

Materials of interest in this investigation are disordered substitutional impurity systems which undergo an insulator-to-metal transition as a function of composition. The ability to reliably predict properties of a given material depends, among other things, upon firmly known answers to two questions: (1) What is the mechanism for electron localization in these materials? (2) What is the correct model to use to describe electron transport in the regime of strong scattering of electrons, just at the transition concentration? Concerning the first question, experiments will be carried out to test the relevance of the Anderson localization model to the metal-insulator transition in semiconductor impurity systems, in sodium tungstate crystals, and a new class of untested materials. Initial experiments will use multiple doped crystals, SiB, Al, Ga and SiLi, P, As, to study the effect which a spread in the value of impurity binding potentials has upon the value total impurity concentration at which electron delocalization occurs. This value will be monitored by measurements of electrical conductivity and Hall constant at low temperature. Concerning question (2), studies of NMR relaxation times will be used to measure electron jump times as functions of composition and temperature, in order to study the evolution of the strong-scattering regime as one moves from delocalized to localized electron states.

This is the first year of a two-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0021, ELECTRONIC STATES AT METAL-SEMICONDUCTOR INTERFACES

A.J. Sievers, Cornell University, Ithaca Campus, School of Arts & Sciences, Dept. of Physics, *Ithaca, New York* 14850 (DF053440; AFOSR-78-3684)

AF function - microwave solid-state electronic devices are essential elements of Air Force surveillance, electronic countermeasures, and communication systems. Opportunity - little is known about the metal-semiconductor interface electronic states that produce the Schottky barrier and there have been only a few techniques that could study these electronic states. Objective - the objective of this research is to study metal-semiconductor interface states using new IR techniques. How work contributes - this research should provide additional knowledge on the physical nature of interface electronic states that would indicate how these states could best be used in a new generation of submicron electrical and optical devices.

An IR surface electromagnetic wave spectrometer and a Fourier transform ellipsometer will be designed and constructed. The excitation spectrum of the electronic interface states will be examined for metal in contact with both group IV and III-V semiconductors with initial research on Ge-Au and Ge-Ag systems by measuring the surface electromagnetic wave absorption as a function of pressure, temperature, D.C. electric field and magnetic field.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0022, SOME NONLINEAR TRANSPORT FLUCTUATIONS IN CONDENSED MATTER

W.W. Webb, Cornell University, Ithaca Campus, School of Engineering, Dept. of Applied & Engineering Physics, *242 Carpenter Hall, Ithaca, New York* 14853 (DMR80-06513)

Experimental studies of nonlinear transport phenomena in condensed matter systems previously supported by NSF grant DMR 7700311A02 will be continued. Experiments will be carried out to study: vorticity fluctuations in turbulent fluid transport utilizing a new optical measure of local vorticity and defects in pseudo-dimensional systems, particularly smectic liquid crystals and molecular bilayer membranes. These experiments are designed to elucidate the putatively nonlinear transport fluctuations.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0023, X-RAY DIFFRACTION, INTERFERENCE AND HOLOGRAPHY

N. George, University of Rochester, Graduate School, *Administration Bldg., Rochester, New York* 14627 (DF051510; AFOSR-78-3563)

AF function - non-destructive testing of structural members of aerospace vehicles could benefit greatly from the development of three-dimensional X-ray holography. Deficiency - holographic techniques are highly developed for electromagnetic radiation in the visible spectrum. X-ray holographic techniques, however, have not been developed and little, if any, research has been attempted to develop them. Objective - the objective of this research is to develop X-ray holographic techniques that can be utilized to evaluate non-destructively the interior of structural members of aerospace vehicles. How work contributes - this research could lead to the above objective.

Basic studies will be conducted in X-ray optics directed toward a critical evaluation of the feasibility of X-ray holography. The theory of partial coherence will be used to analyze interference methods for the characterizations of x-ray sources, including DAS GUPTA's narrow line sources. Related studies of recoding media, microscopy, zone-plate imaging, speckle and photomixing will be performed

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0024, STUDY OF ELECTRON IMPACT OF LASER MEDIA

D.E. Golden, University of Oklahoma, Norman Campus, School of Arts & Sciences, Dept. of Physics & Astronomy, *660 Parrington Oval, Room 101, Norman, Oklahoma* 73069 (ECS79-10029)

The experimental program is aimed at the measurement of the basic parameters necessary for the design of lasers pumped by electron impact. The parameters being measured are the electron impact excitation cross-sections, optical branching ratios of the subsequent decays, excited state lifetimes, polarization of the radiation, and collisional deactivation decay and energy transfer rates in the case of metastable excitation for a number of target atoms and molecules. Measurements are being made on cross-sections to excitation of fine structure states and the accompanying collision parameters in electron-photon correlation experiments and in electron scattering experiments from state-selected atoms and molecules. The measurements are at sufficient electron energy resolution so that particular attention can be directed towards the role of resonances in the excitation process.

This is a continuation of research previously supported under ENG-7682943.

SUPPORTED BY U.S. National Science Foundation, Directorate for Engineering & Applied Science, Div. of Electrical Computer & Systems Engineering

8.0025, GRADUATE STUDENT RESEARCHERS PROGRAM

R.A. Anthes, Pennsylvania State University, University Park Campus, School of Earth & Mineral Science, Dept. of Meteorology, *116 Deike Bldg., University Park, Pennsylvania* 16802 (NGT 39-009-801)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

8.0026, GRADUATE STUDENT RESEARCHERS PROGRAM

J.S. Nisbet, Pennsylvania State University, University Park Campus, School of Engineering, Dept. of Electrical Engineering, *101 Hammond Bldg., University Park, Pennsylvania* 16802 (NGT 39-009-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

8.0027, MINORITY CARRIER INJECTION INTO MATERIALS CONTAINING TRAPS

H.K. Henisch, Pennsylvania State University, University Park Campus, School of Science, Dept. of Physics, *211 Whitmore Lab., University Park, Pennsylvania* 16802 (DMR79-13178)

Recent findings in transport theory suggest that the presence of traps may play a major role in modifying the effect of injected minority carriers on the electric field profile and hence on the local effective resistivity of semiconducting materials. The present series of experiments will be continued in order to verify these findings and, in particular, to measure the local field maximum (effective resistance increase) at low current densities. High grade germanium will be mounted with electrodes in situ. Field profile measurements will be made before and after neutron irradiation. The experimental results to date are in qualitative and quantitative agreement with theory but they need to be extended to higher trap densities. The results of these studies are expected to lead to basic modification of the transport theory for injection in semiconductors.

This is a continuation of research previously supported by NSF grant DMR-7680619.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0028, STATISTICAL MECHANICAL STUDIES OF PHASE TRANSITIONS

M.S. Green, Temple University, Graduate School, Dept. of Physics, *1821 N. Broad St., Philadelphia, Pennsylvania* 19122 (DMR78-07201)

Research previously supported under DMR74-01951. Theoretical research in condensed matter physics will be carried out. Statistical mechanics will be used to investigate the dynamics of first- and second-order phase transitions, the foundations of the equations of hydrodynamics, the nature of the critical point in a Van der Waals fluid and the mathematical properties of the renormalization group.

This research is focused on understanding the fundamental behavior of condensed matter near a critical point or phase transition.

This is the first year of a two-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0029, HIGH FIELD BUBBLE CHAMBER AND MULTIPARTICLE SPECTROMETER EXPERIMENTS

C.E. Roos, Vanderbilt University, School of Arts & Sciences, Dept. of Physics & Astronomy, *21st Ave. S., Nashville, Tennessee* 37232 (PHY80-01621)

There are three current experiments at Vanderbilt which study multi-quark exotic states. These include S-159 at CERN, which is looking for S equals 2 dibaryon states using the reaction K-d yields K-plus X-minus, where the K-plus is detected by a missing mass spectrometer; and two double-Vee experiments using the multiparticle spectrometers at BNL (705) and FNAL (580). The BNL and FNAL experiments are identical in concept but have 2 mass ranges for the possible new quantum states. They study the reaction pi-p vovo plus X at 23 CeV/c and at 300 GaV/c and the 0 to 4 trigger of the MPS can look for states with 0 ions, 2 ions, 4 ions etc. Further studies related to using the unique sample of 100K sigmas are under way, such as lifetime studies. Extensions of S. Reucroft's charm lifetime experiment, NA13/CERN, are expected to be part of the Vanderbilt program in the next couple of years.

This is the first year of a two-year continuing grant, previously supported under NSF award PHY77-27087 AO1.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Physics

8.0030, ZONAL WIND DYNAMICS IN THE ATMOSPHERES OF JUPITER AND SATURN FROM VOYAGER IRIS MEASUREMENTS - GRADUATE STUDENT RESEARCHERS PROGRAM

J.W. Chamberlain, Rice University, Graduate School, Dept. of Space Physics & Astronomy, *6100 Main St., Houston, Texas* 77001 (NGT 44-006-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

8.0031, INVESTIGATIONS IN X-RADIATION STIMULATION

K. Das Gupta, Texas Tech University, School of Arts & Sciences, Dept. of Physics, *P.O. Box 4340, Lubbock, Texas* 79409 (DF035070; AFOSR-76-3098)

AF function - non-destructive testing of structural members of aerospace vehicles could benefit greatly from the development of an X-ray laser for use in three-dimensional holography. Deficiency - attempts to develop an X-ray laser by standard population inversion techniques have been unsuccessful primarily because of short lifetimes of excited states. Objective - the objective of this research is to investigate the nature of nearly non-divergent beams of X-rays (hot spots) which apparently are generated by hitherto undiscovered processes and to use this radiation to make three-dimensional holograms of opaque materials. How work contributes - an understanding of the nature of these hot spots could lead to or contribute to the development of X-ray lasers and three-dimensional holography could lead to

important non-destructive testing techniques for structural materials.

The nearly non-divergent beams of X-rays will be studied to determine their penetration properties in various materials, role of stimulated emission, and the degree of coherence and polarization. Three-dimensional holograms will be made in collaboration with Prof. N. George of the University of Rochester

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0032, GRADUATE STUDENT RESEARCHERS PROGRAM
B.S. Middleditch, University of Houston, School of Natural Sciences & Mathematics, Dept. of Biophysical Sciences, *3801 Cullen Blvd., Houston, Texas* 77004 (NGT 44-005-800)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

8.0033, A STUDY OF PHYSICAL PROCESSES FOR SPACE-RADIATION PROTECTION
G.S. Khandelwal, Old Dominion University, School of Sciences & Health Professions, Dept. of Physics Geophysics, *P.O. Box 6173, Norfolk, Virginia* 23508 (NCC 1-42)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

8.0034, INFLUENCE OF SPUTTERING PARAMETERS ON FILM STRUCTURE
C.R. Houska, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Materials Engineering, *Blacksburg, Virginia* 24061 (DMR80-00933)

This research focuses on the interrelationships between the sputtering parameters and the fine structure of the resultant films. These parameters control the local energy distributions of bombarding particles at the film surface and therefore the concentration of embedded defects found in as-prepared films. Films with embedded atoms can be made with improved mechanical stability, low resistivity and high reflectivity. These will be characterized in terms of non-uniform dislocation strains, strains introduced by embedded atoms interacting with various boundaries, uniform macrostrains and crystal orientation. Samples will be prepared with different substrates so that the defect structures due to sputtering alone can be distinguished from those resulting from differential contractions on cooling.

This is a renewal of NSF Grant DMR75-17201.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0035, ION COLLISION STUDIES
R. Geballe, University of Washington, School of Arts & Sciences, Dept. of Physics, *Seattle, Washington* 98105 (PHY80-02079)

Two experimental projects are proposed. The first is an extension of their study of photodetachment (from K-) to other alkali negative ions (Li-, Na-, ...). They will ascertain branching ratios for decay of the ions under photon bombardment into excited states of the neutral residues by detecting the optical decay radiations. From these ratios, information about the structure and dynamics of the negative ions can be deduced. They hope to learn whether previously observed qualitative deviations from existing theory are general. They also will measure stripping cross-sections from the above ions.

The second part of this proposal is a study of electron capture by highly stripped ions using various gas targets. Ions such as C plus 5, C plus 6, O plus 7 and O plus 8 are formed in a laser-induced plasma which is produced by focusing the output of a CO2 laser onto a suitable solid target. Electrostatic and time-of-flight techniques will be used to determine cross-sections for a particular charge and energy. This study will cover collision energies from 100 eV to 10 KeV, a previously unexplored area. The results should help to determine which of several theoretical models are correct and will be pertinent in the areas of fusion and X-ray lasers.

This research is a continuation of that currently supported under NSF grant PHY78-00856.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Physics

SOCIAL SCIENCES

Includes Social Sciences (general); Administration and Management; Documentation and Information Science; Economics and Cost Analysis; Law and Political Science; and Urban Technology and Transportation.

9.0001, A STUDY OF THE FACTORS INFLUENCING THE PERFORMANCE AND MORALE OF SMALL RESEARCH GROUPS IN ISOLATION
C.H. Castore, Purdue University, School of Humanities Social Science & Education, Dept. of Psychological Sciences, *Life Sciences Bldg., West Lafayette, Indiana* 47907 (NCA 2-605001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, SPECTROPOLARIMETRY OF LATE-TYPE VARIABLE STARS
G.V. Coyne, University of Arizona, Lunar & Planetary Lab., *Tucson, Arizona* 85721 (INT77-20882)

In this award NSF provides funds to permit Dr. George Coyne of the Lunar and Planetary Observatory of the University of Arizona to carry on a cooperative research program with Drs. Antonio M. Magalhaes and Sayd J. Codina of the Institute of Astronomy and Geophysics of the University of Sao Paulo, Brazil.

Their work on Spectropolarimetry of Late-Type Variable Stars is part of a larger effort for the exploration of the properties of the atmospheres of these pulsating stars. This work on narrow band spectropolarimetry should provide some of the missing information on the atmospheres of long-period variable stars. The large number of these stars indicates their importance in the process of stellar evolution.

SUPPORTED BY U.S. National Science Foundation, Directorate for Scientific Technological & Internat. Affairs, Div. of International Programs

10.0002, THEORETICAL COSMOGONY
P.H. Bodenheimer, University of California, Santa Cruz Campus, Lick Observatory, *Mount Hamilton, California* 95140 (AST79-21263)

This project is designed to improve our knowledge of the origin and early history of the solar system and of the giant planets and their satellite sytems. The basic assumptions are that the Sun and planets formed about the same time out of a rotating, flattened 'solar nebula' and that the giant planets formed out of subcondensations of this nebula. Specific problems to be attacked include: (1) the process by which the solar nebula forms out of an interstellar cloud fragment, (2) the mechanisms by which angular momentum is removed from the center of the nebula to allow formation of the Sun, (3) the stability of the nebula to bar-like perturbations that might cause it to break up into a binary star system, (4) the mechanisms by which single stars form rather than binary or multiple systems, and (5) the process by which a rotating subcondensation evolves to form a central planet and a regular satellite system. Analogies between the solar system as a whole and the Jupiter-Saturn systems will be explored. These questions will be investigated theoretically with the aid of numerical computer programs which solve the equations of hydrodynamics in two or three space dimensions.

Observational and experimental evidence will be used to constrain possible models.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0003, LABORATORY INFRARED SPECTRAL MEASUREMENTS OF MOLECULES OF INTEREST IN ATMOSPHERIC CHEMISTRY

D.G. Murcray, University of Denver, School of Arts & Sciences, Dept. of Physics & Astronomy, *2115 S. University Blvd., Denver, Colorado* 80210 (ATM79-14165)

High-resolution infrared absorption spectra of individual atmospheric trace gases will be obtained in a laboratory measurement program. Emphasis will be given to gases having current interest in problems of trace-gas effects in atmospheric chemistry. Included are gases believed to affect the stratospheric ozone layer, e.g., nitrous oxide and the halocarbons. Other substances of interest in the program are hydrogen peroxide, nitric acid, carbonyl sulfide, hydrogen sulfide, carbon disulfide, sulfur dioxide, formaldehyde, ammonia, and certain hydrocarbons. Priority selections from this list will be influenced by current findings in a parallel field observation program.

The spectra obtained in the project will be useful for identifying trace gases observed by ground-based observations of atmospheric absorptions of molecular spectral lines, and for other purposes. The spectral region to be studied is from 700 to 4000 reciprocal centimeters. Readings will be taken at resolutions of 0.05 and 0.015 reciprocal centimeters. Experimental conditions will be adjusted to obtain spectra corresponding to molecular bands and gas concentrations considered feasible for observation in the solar spectrum. Attention will be given to the spectra of potentially interfering species as well as to spectra of target molecules.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Atmospheric Sciences

10.0004, SPACE RESEARCH TECHNOLOGY

T.A. Chubb, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN320221)

To develop and construct demonstration devices of value to the Navy and DOD based on technology developed for the rocket program, e.g., IR, visible and UV surveillance sensors based on image converters and solid-state arrays used in space astronomy. To develop devices needed for the NRL rocket and satellite program, position determining X-ray sensors, band-sensitive optical detectors, thick film electronic packaging techniques and counter-shift register circuitry, telemetry decoding systems and computer data interfaces.

Image converter designs developed in the far UV astronomy program are adapted to other spectral bands. Imaging techniques are developed for X-rays. Large area X-ray sensors are developed for X-ray astronomy. Spectral modulation sensor systems are developed to detect line radiation sources against continuum background in IR.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

10.0005, HYDROXYL MASERS AND THE STRUCTURE OF LONG PERIOD VARIABLE CIRCUMSTELLAR MASS FLOW

J.D. Fix, University of Iowa, School of Liberal Arts, Dept. of Physics & Astronomy, *Jessup Hall, Iowa City, Iowa* 52240 (AST79-25076)

This research program will be devoted to a program of high resolution observations of the velocity and spatial structure of certain regions surrounding long period variable stars. These regions contain the hydroxyl molecule (OH). The radio emission from the molecule, interpreted with the help of models of masers in circumstellar mass flows, should considerably improve our understanding of the conditions which exist in the material flowing from long period variable stars into interstellar space. The observations will be made using high frequency resolution single telescope spectra and high spatial resolution data obtained using very long baseline interferometric techniques.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0006, THEORETICAL STUDIES OF THE EVOLUTION OF ROTATING STARS

A.S. Endal, Louisiana State University, Agricultural & Mechanical College, School of Arts & Sciences, Dept. of Physics & Astronomy, *University Station, Baton Rouge, Louisiana* 70803 (AST79-19688)

The effects of rotation on the structure and evolution of stars remains an open question. To a large degree, this can be attributed to difficulties in determining how angular momentum is transported from the contracting core to the expanding envelope of an evolving star. Recent numerical calculations based on linear analyses of angular momentum transport mechanisms have resulted in substantial progress in this area. However, the results need to be tested by quantitative comparisons of predicted and observed properties of rotating stars. This requires additional calculations specifically geared toward those stars whose observed surface properties provide the strongest constraints on the theoretical calculations.

Calculations of the evolution and rotation of stellar models will be pursued in order to predict (and compare with observations of) the following quantities: a) surface rotation rates, positions in the HR diagram, and mass loss rates for Be stars; b) the distribution of surface rotation rates of O stars; c) the range of surface rotation rates of K giants and supergiants (evolved stars with convective envelopes); and d) changes in the surface abundances of CNO-nuclei resulting from rotationally induced mixing.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0007, GRADUATE STUDENT RESEARCHERS PROGRAM

E.A. Boldt, University of Maryland, College Park Campus, School of Arts & Sciences, Dept. of Physics & Astronomy, *College Park, Maryland* 20742 (NGT 21-002-804)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

10.0008, GRADUATE STUDENT RESEARCHERS PROGRAM

W.K. Rose, University of Maryland, College Park Campus, School of Arts & Sciences, Dept. of Physics & Astronomy, *College Park, Maryland* 20742 (NGT 21-002-801)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

10.0009, GRADUATE STUDENT RESEARCHERS PROGRAM

D.G. Wentzel, University of Maryland, College Park Campus, School of Arts & Sciences, Dept. of Physics & Astronomy, *College Park, Maryland* 20742 (NGT 21-002-802)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

10.0010, GALACTIC AND EXTRAGALACTIC ASTRONOMY

B.F. Burke, Massachusetts Inst. of Technology, School of Science, Dept. of Physics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (AST79-20984)

A program for the study of the active nuclei of quasars and galaxies, the structure of radio and normal galaxies, and the dynamics of high velocity clouds and the interstellar medium will

be carried out. The research will require the use of the technique of Very Long Baseline Interferometry (VLBI), the Very Large Array (VLA) and other major instruments of the National Radio Astronomy Observatory, the Haystack Radio Observatory, and the Arecibo 1000 ft. radio telescope. The interactions between the various components of the radio sources, including the questions of maser formation, the generation of relativistic particles, and the relationships between normal galaxies, radio galaxies, Seyfert galaxies, and quasars will be studied.

This research was previously supported under grant AST-7726896AO1.

SUPPORTED BY U.S. National Science Foundation,
Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0011, COLLABORATIVE SOLAR RADIO ASTRONOMY
K. Lang, Tufts University, Medford Campus, Graduate School, Dept. of Physics, *Medford, Massachusetts* 02155 (INT80-06066)

The award supports collaborative research in solar radio astronomy between U.S. scientists at Tufts University and Italian scientists at the Arcetri Observatory. The project takes place under the auspices of the U.S.-Italy Cooperative Science Program of the National Science Foundation and the Italian National Research Council (CNR).

The objective of the collaboration is to study the three-dimensional structure of the coronal atmosphere and the time development of the coronal magnetic field before and during the emission of solar flares in order to advance the state of knowledge about solar active regions. Simultaneous observations will be undertaken at a variety of wavelengths at two major radio telescopes, the Very Large Array in New Mexico and the Westerbork Synthesis Radio Telescope in the Netherlands.

SUPPORTED BY U.S. National Science Foundation,
Directorate for Scientific Technological & Internat. Affairs, Div. of International Programs

10.0012, PLAN AND ESTABLISH THE PRELIMINARY INTERFACE BETWEEN THE ORBITER AND THE MIXER RECEIVER SYSTEM
K.S. Yngvason, University of Massachusetts, Amherst Campus, School of Arts & Sciences, Dept. of Astronomy, *Amherst, Massachusetts* 01002 (NAS 5-26151)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

10.0013, A STUDY OF THE CLOSE BINARY SYSTEM VW CEPHEI
A.P. Linnell, Michigan State University, School of Natural Sciences, Dept. of Astronomy & Astrophysics, *243 Natural Resources Bldg., East Lansing, Michigan* 48824 (AST80-02116)

Observations in BVRI bands will be obtained at Kitt Peak of the W-subclass W UMa star VW Cephei. These observations will be combined with existing photometric data in an attempt to represent this sytem on the Anderson-Shu theory. Solutions will also be sought on the model represented by light synthesis solutions in the literature, and the ability of the two models to represent W-subclass systems will be compared. The additional constraint provided by the Anderson-Shu line profile model will be evaluated. Analysis of the V-R or V-I color data will be used to determine whether the less massive component in W-subclass systems is hotter than the primary. The existing photometric data will be analyzed in an attempt to characterize cycle-to-cycle light variations.

SUPPORTED BY U.S. National Science Foundation,
Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0014, PROTOTYPE GE:GA DETECTORS FOR A COOLED GRATING SPECTROMETER
J.R. Houck, Cornell University, Ithaca Campus, School of Arts & Sciences, Dept. of Astronomy, *Ithaca, New York* 14850 (NCC 2-79)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

GENERAL

11.0001, DEVELOP AND EVALUATE A PERFORMANCE AND COST MODELING CAPABILITY FOR THE NASA DATA MANAGEMENT SYSTEM
Unknown, Purdue University, Graduate School, *Executive Bldg., West Lafayette, Indiana* 47907 (NAS 5-26196)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

11.0002, 10TH SUMMER RESEARCH PARTICIPATION PROGRAM
N.K. Proctor, Morgan State University, School of Arts & Sciences, Dept. of Biology, *Baltimore, Maryland* 21212 (NGT 21-025-080)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

VOLUME 18 NUMBER 24/DECEMBER 23, 1980

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N80-33336* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY, SUPPLEMENT 125
Aug. 1980 125 p
(NASA-SP-7037(125)) Avail: NTIS HC $5.00 CSCL 01A

This bibliography lists 407 reports, articles, and other documents introduced into the NASA scientific and technical information system in July 1980. Author

N80-33337 Society of Experimental Test Pilots, Lancaster, Calif.
TECHNICAL REVIEW, VOLUME 15, NO. 1
1980 52 p refs
(Issue-1) Copyright. Avail: Issuing Activity

Oblique wing aircraft, circulation control wing flight tests, and stall/spin flight tests are discussed. A brief review of loss of consciousness and methods for avoiding it are discussed. For individual titles, see N80-33338 through N80-33341.

N80-33338* National Aeronautics and Space Administration, Hugh L. Dryden Flight Research Center, Edwards, Calif.
THE OBLIQUE WING-RESEARCH AIRCRAFT c02
William H. Andrews *In* Society of Experimental Test Pilots Tech. Rev., Vol. 15, No. 1 1980 p 4-5 ref (For primary document see N80-33337 24-01)
Avail: Issuing Activity

The AD-1 airplane was designed as a low cost, low speed manned research tool to evaluate the flying qualities of the oblique wing concept. The airplane is constructed primarily of foam and fiberglass and incorporates simplicity in terms of the onboard systems. There are no hydraulics, the control system is cable and torque tube, and the electrical systems consist of engine driven generators which power the battery for engine start, cockpit gages, trim motors, and the onboard data system. The propulsion systems consist of two Microturbo TRS-18 engines sea level trust rated at 220 pounds. The airplane weighs approximately 2100 pounds and has a performance potential in the range of 200 knots and an altitude of 15,000 feet. E.D.K.

N80-33339 Grumman Aerospace Corp., Bethpage, N.Y.
CIRCULATION CONTROL WING (CCW) FLIGHT TESTS c05
Chuck Sewell *In* Society of Experimental Test Pilots Tech. Rev., Vol. 15, No. 1 1980 p 6-35 (For primary document see N80-33337 24-01)
Avail: Issuing Activity

The circulation control wing (CCW) design involves converting the trailing edge of the airfoil into an enlarged rounded surface to which a jet of air adheres when blown tangentially from the upper surface. The resulting high augmentation of circulation lift reduces landing approach and takeoff velocities and distances and offers options for increased airplane payload and wing loading. The A-6A airplane was selected as the demonstration testbed, primarily because of aerodynamics. The determining factors in its selection were its aspect ratio, full span flaps, horizontal tail area, moderate wing sweep, airfoil thickness, and twin engines. E.D.K.

N80-33340* National Aeronautics and Space Administration, Langley Research Center, Hampton, Va.
NASA GENERAL AVIATION STALL/SPIN FLIGHT TESTING Status Report c05
James M. Patton, Jr. *In* Society of Experimental Test Pilots Tech. Rev., Vol. 15, No. 1 1980 p 36-49 refs (For primary document see N80-33337 24-01)
Avail: Issuing Activity CSCL 01C

A comprehensive program incorporating spin tunnel, static and rotary balance wind tunnel, full scale wind tunnel, free flight radio control model, flight simulation, and full scale flight testing was undertaken. Work includes aerodynamic definition of various configurations at high angles of attack, testing of stall and spin prevention concepts, definition of spin and spin recovery characteristics, and development of test techniques and emergency spin recovery systems. Some of the more interesting results to date are presented for the first airplane in the program in the areas of tail design, wind leading edge design, mass distribution, center of gravity location, and small airframe changes, with associated pilot observations. Design philosophy of the spin recovery parachute system is discussed, in addition to test techniques. E.D.K.

N80-33341 Air Force Hospital, Davis-Monthan AFB, Ariz.
LOSS OF CONSCIOUSNESS IN HIGH PERFORMANCE FIGHTERS (WHAT TO DO ABOUT IT) c52
Peter R. Nash *In* Society of Experimental Test Pilots Tech. Rev., Vol. 15, No. 1 1980 p 50-52 (For primary document see N80-33337 24-01)
Avail: Issuing Activity

The solution for loss of consciousness is to increase the ability of the pilot to withstand rapid onset, high G loading. This can be done through conditioning and training of the aircrews, and better life support equipment. Methods for improving G tolerances are reviewed. E.D.K.

N80-33342*# National Aeronautics and Space Administration, Langley Research Center, Hampton, Va.
CONCEPTUAL STUDY OF AN ADVANCED SUPERSONIC TECHNOLOGY TRANSPORT (AST-107) FOR TRANSPACIFIC RANGE USING LOW-BYPASS-RATIO TURBOFAN ENGINES
Shelby J. Morris, Jr., Willard E. Foss, Jr., and Milton J. Neubauer, Jr. Sep. 1980 96 p refs
(NASA-TM-81872) Avail: NTIS HC A05/MF A01 CSCL 01C

An advanced supersonic technology configuration concept designated the AST-107, using a low bypass ratio turbofan engine, is described and analyzed. The aircraft had provisions for 273 passengers arranged five abreast. The cruise Mach number was 2.62. The mission range for the AST-107 was 8.48 Mm (4576 n.mi.) and an average lift drag ratio of 9.15 during cruise was achieved. The available lateral control was not sufficient for the required 15.4 m/s (30 kt) crosswind landing condition, and

a crosswind landing gear or a significant reduction in dihedral effect would be necessary to meet this requirement. The lowest computed noise levels, including a mechanical suppressor nose reduction of 3 EPNdB at the flyover and sideline monitoring stations, were 110.3 EPNdB (sideline noise), 113.1 EPNdB (centerline noise) and 110.5 EPNdB (approach noise). Author

N80-33343# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
CRITERIA FOR APPLYING COMMERCIAL AIRCRAFT WARRANTIES IN USAF AIRCRAFT PURCHASES M.S. Thesis
Jack L. Grubb and Thomas O. Sutliff Jun. 1980 142 p refs (AD-A088774; AFIT-LSSR-37-80) Avail: NTIS HC A07/MF A01 CSCL 15/5

The airlines' criteria in evaluating warranties to determine if these commercial practices can be used by Air Force buying activities were studied. Criteria to evaluate warranties were obtained from the trunk airlines through interviews and a questionnaire. The airlines' rankings of the criteria were compared to rankings by Aeronautical Systems Division (ASD) contracting experts. The airlines and the Air Force emphasize different factors in evaluating warranties. The greatest difference was the emphasis placed on cost effectiveness of a warranty by the ASD experts compared to the lack of emphasis on this factor by the airline experts. The Air Force contracting experts have a false perception of airline practices in evaluating aircraft warranties. T.M.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

N80-33344 Ohio State Univ., Columbus.
A COMPREHENSIVE INVESTIGATION INTO THE SUPERSONIC VISCOUS FLOW ABOUT A SLENDER CONE AT HIGH ANGLE OF ATTACK: EXPERIMENTAL AND THEORETICAL RESULTS Ph.D. Thesis
Thomas Stuart Rice 1980 305 p
Avail: Univ. Microfilms Order No. 8022333

An experimental and theoretical investigation of the flow field in the vicinity of a cone at angle of attack was conducted. Experimental tests were performed on a slightly blunted, eight degree half angle, right circular cone. Tests were carried out using air at a Mach number of 5.4 and a Reynolds number of 2.1 million based on free stream conditions. Since at these conditions a laminar boundary layer exists over the entire body surface, the turbulent case was studied by inducing artificial transition. Surface temperature distributions, obtained from measured infrared emittance profiles exhibited by the model surface, provided quantitative verification of transition, in addition to qualitative data concerning surface heat transfer rates which was obtained with phase change coatings. Surface and base pressure distributions were measured for attack angles up to 15 degrees using both the clean and trip nosed models. In addition, a particular attempt was made to characterize the nature of the fluctuating pressure field in the base region of the model. Dissert. Abstr.

N80-33345*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIMENTAL UNSTEADY AERODYNAMICS OF CONVENTIONAL AND SUPERCRITICAL AIRFOILS
Sanford S. Davis and Gerald Malcolm, N. Aug. 1980 100 p refs Document includes a microfiche supplement
(NASA-TM-81221; A-8294) Avail: NTIS HC A04/MF A01 CSCL 01A

Experimental data on the unsteady aerodynamics of oscillating airfoils in transonic flow are presented. Two 0.5 m-chord airfoil models - an NACA 64A010 and an NLR 7301 - were tested in the NASA-Ames 11 by 11 foot Transonic Wind Tunnel at Mach numbers to 0.85, at chord Reynolds numbers to 12 million and at mean angles of attack to 4 deg. The airfoils were subjected to both pitching and plunging motions at reduced frequencies to 0.3 (physical frequencies to 53 Hz). The new hardware and the extensive use of computer-experiment integration developed for this test are described. The geometrical configuration of the model and the test arrangement are described in detail. Mean and first harmonic data are presented in both tabular and graphical form to aid in comparisons with other data and with numerical computations. T.M.

N80-33346*# National Aeronautics and Space Administration, Washington, D. C.
ON THE SWELLING OF ROLLED UP VORTEX SURFACES AND THE BREAKDOWN OF THE VORTEX CORE FOR SLENDER WINGS
Arabindo Das Oct. 1980 26 p refs Transl. into ENGLISH from Z. Flugwiss. (West Germany), v. 15, 1967 p 355-362 Transl. by Scientific Translation Service, Santa Barbara, Calif. (Contract NASw-3198)
(NASA-TM-75862) Avail: NTIS HC A03/MF A01 CSCL 01A

Simplified models of the vortex distribution over cylindrical surfaces are developed. The effect of a change of vortex strength was analyzed quantitatively by menas of potential theory. The considerable bulging of the cylindrical vortex sheet as a consequence of the change of the vortex strength is discussed. The coiling-up of the vortices rotation in opposite directions over the cylindrical surface renders the condition for instability and the subsequent large spreading of the vortex core. These processes occur without a positive pressure gradient being necessary in the field of flow surrounding the coiled up vortex sheet. T. M.

N80-33347*# National Aeronautics and Space Administration, Langley Research Center, Hampton, Va.
LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A HIGHLY SWEPT ARROW WING CONFIGURATION WITH SEVERAL DEFLECTED LEADING EDGE CONCEPTS
Garl L. Gentry, Jr. and Paul L. Coe, Jr. Jul. 1980 97 p
(NASA-TM-80180) Avail: NTIS HC A05/MF A01 CSCL 01A

The effectiveness of leading edge concepts for minimizing or controlling leading edge flow separation was studied. Emphasis was placed on low speed performance, stability, and control characteristics of configurations with highly swept wings. Simple deflection of the leading edge, a variable camber leading edge system, and a leading edge vortex flow system were among the concepts studied. The data are presented without analysis. J.M.S.

N80-33348*# National Aeronautics and Space Administration, Langley Research Center, Hampton, Va.
A FLIGHT INVESTIGATION OF PERFORMANCE AND LOADS FOR A HELICOPTER WITH 10-64C MAIN ROTOR BLADE SECTIONS
Charles E. K. Morris, Robert L. Tomaine (AVRADCOM, St. Louis, Mo.), and Daniene D. Stevens Oct. 1980 146 p refs
(NASA-TM-81871; AVRADCOM-TM-80-B-2) Avail: NTIS HC A07/MF A01 CSCL 01A

A flight investigation produced data on performance and rotor loads for a teetering rotor, AH-1G helicopter flown with a main rotor that had the NLR-1T airfoil as the blade section contour. The test envelope included hover, forward flight speeds from 34 to 83 m/sec (65 to 162 knots), and collective fixed maneuvers at about 0.25 tip speed ratio. The data set for each test point describes vehicle flight state, control positions, rotor loads, power requirements, and blade motions. Rotor loads are reviewed primarily in terms of peak to peak and harmonic content. Lower frequency components predominated for most loads and generally increased with increased airspeed, but not necessarily with increased maneuver load factor. Detailed data for an advanced airfoil on an AH-1G are presented. T.M.

N80-33349*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.
COMPARISON OF CALCULATED AND MEASURED HELICOPTER ROTOR LATERAL FLAPPING ANGLES
Wayne Johnson Jul. 1980 27 p refs Prepared in cooperation with Army Aviation Research and Development Command, St. Louis, Mo.

(NASA-TM-81213; AVRADCOM-TR-80-A-11; A-8239) Avail: NTIS HC A03/MF A01 CSCL 01A

Calculated and measured values of helicopter rotor flapping angles in forward flight are compared for a model rotor in a wind tunnel and an autogiro in gliding flight. The lateral flapping angles can be accurately predicted when a calculation of the nonuniform wake-induced velocity is used. At low advance ratios, it is also necessary to use a free wake geometry calculation. For the cases considered, the tip vortices in the rotor wake remain very close to the tip-path plane, so the calculated values of the flapping motion are sensitive to the fine details of the wake structure, specifically the viscous core radius of the tip vortices. Author

N80-33350*# Northrop Corp., Hawthorne, Calif. Aircraft Div.
FLOW VISUALIZATION STUDY OF THE F-14 FIGHTER AIRCRAFT CONFIGURATION
Dale J. Lorincz Sep. 1980 39 p refs
(Contract NAS4-2616)
(NASA-CR-163098; NOR-80-150; H-1135) Avail: NTIS HC A03/MF A01 CSCL 01A

Water tunnel studies were performed to qualitatively define the flow field of the F-14. Particular emphasis was placed on defining the vortex flows generated at high angles of attack. The flow visualization tests were conducted in the Northrop water tunnel using a 1/72 scale model of the F-14 with a wing leading-edge sweep of 20 deg. Flow visualization photographs were obtained for angles of attack up to 55 deg and sideslip angles up to 10 deg. The F-14 model was investigated to determine the vortex flow field development, vortex path, and vortex breakdown characteristics as a function of angle of attack and sideslip. Vortex flows were found to develop on the highly swept glove and on the upper surface of the forebody. At 10 deg of sideslip, the windward glove vortex shifted inboard and broke down farther forward than the leeward glove vortex. This asymmetric breakdown of the vortices in sideslip contributes to a reduction in the lateral stability above 20 deg angle of attack. The initial loss of directional stability is a consequence of the adverse sidewash from the windward vortex and the reduced dynamic pressure at the vertical tails. T.M.

N80-33351*# Sikorsky Aircraft, Stratford, Conn.
ANALYSIS AND CORRELATION OF TEST DATA FROM AN ADVANCED TECHNOLOGY ROTOR SYSTEM Final Report, Mar. 1979 - Jun. 1980
D. Jepson, R. Moffitt, and J. Bissell Hilzinger Jul. 1980 169 p refs
(Contract NAS2-10211)
(NASA-CR-152366; SER-510034) Avail: NTIS HC A08/MF A01 CSCL 01A

The performance and blade vibratory loads characteristics for an advanced rotor system as predicted by analysis and as measured in a 1/5 scale model wind tunnel test, a full scale model wind tunnel test and flight test were compared. The 1/5 scale model rotor predicted conservative full scale rotor performance as expected due to Reynolds number effects. Although blade vibratory moment trends with advance ratio were predicted by the 1/5 scale model, the absolute values of the blade vibratory moments were underpredicted. The full scale model predicted forward flight performance within + or - 5%. Blade vibratory loads, however, were underpredicted. The result of rotor inflow distortions imparted by the flow over the fuselage. The coupled normal modes (Y201) elastic rotor blade analysis incorporating variable inflow was able to predict most of the trends of the test data at the higher advance ratios, but was unable to predict the absolute magnitude of the blade 1/2 peak to peak moments at all cruise speed and rotor lift conditions. A.R.H.

N80-33352# National Inst. for Aeronautics and Systems Technology, Pretoria (South Africa).
THE PROBLEM OF WIND TUNNEL FLOW NONUNIFORMITY IN FREE-MODEL AIRCRAFT DYNAMIC STABILITY
M. E. Beyers Apr. 1979 34 p refs Presented at 51st Semiann. Meeting of the Supersonic Tunnel Assoc., Valencia, Calif. 10-11 Apr. 1979
(CSIR-NIAST-79-60) Avail: NTIS HC A03/MF A01

The significance of flow nonuniformity as a factor determining the ultimate accuracy of wind tunnel dynamic tests is considered. The particular implications for aircraft model free-flight tests are examined on the basis of 6 degree-of-freedom trajectory simulations. A mathematical model is introduced for the simulation of arbitrary flow angularity distributions in wind tunnels with a view to investigating the sensitivity of free flight dynamic stability data with different forms of flow irregularities. It is shown that wind tunnel free flight tests of high-performance aircraft configurations are feasible, and concluded that the direct dynamic derivatives could be determined without any difficulty, while the extraction of dynamic cross-coupling derivatives would be limited only by flow nonuniformities. Author

N80-33353*# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Aeronautics.
STEADY STATE SPURIOUS ERRORS IN SHOCK-CAPTURING NUMERICAL SCHEMES
Lasse K. Karlsen Dec. 1978 25 p refs
(KTH-AERO-TN-60; TRITA-FPT-032) Avail: NTIS HC A02/MF A01

The behavior of the steady state spurious error modes of the MacCormack scheme and the upwind scheme of Warming and Beam was obtained from a linearized difference equation for the steady state error. It was shown that the spurious errors can exist either as an eigensolution of the homogeneous part of this difference equation or because of excitation from large discretization errors near oblique shocks. It was found that the upwind scheme does not permit spurious oscillations on the upstream side of shocks. Examples are given for the inviscid Burgers' equation and for one and two dimensional gasdynamic flows. Author

N80-33354*# Lockheed Missiles and Space Co., Palo Alto, Calif.
NUMERICAL METHOD FOR PREDICTING FLOW CHARACTERISTICS AND PERFORMANCE OF NONAXISYMMETRIC NOZZLES. PART 2: APPLICATIONS Final Report
P. D. Thomas Oct. 1980 117 p refs
(Contract NAS1-15084)
(NASA-CR-3264; LMSC-D678888-Pt-2) Avail: NTIS HC A06/MF A01 CSCL 01A

A computer implemented numerical method for predicting the flow in and about an isolated three dimensional jet exhaust nozzle is summarized. The approach is based on an implicit numerical method to solve the unsteady Navier-Stokes equations in a boundary conforming curvilinear coordinate system. Recent improvements to the original numerical algorithm are summarized. Equations are given for evaluating nozzle thrust and discharge coefficient in terms of computed flowfield data. The final formulation of models that are used to simulate flow turbulence effect is presented. Results are presented from numerical experiments to explore the effect of various quantities on the rate of convergence to steady state and on the final flowfield solution. Detailed flowfield predictions for several two and three dimensional nozzle configurations are presented and compared with wind tunnel experimental data. Author

N80-33355*# Bihrle Applied Research, Inc., Jericho, N. Y.
ROTARY BALANCE DATA FOR A TYPICAL SINGLE-ENGINE GENERAL AVIATION DESIGN FOR AN ANGLE OF ATTACK RANGE OF 8 DEG TO 90 DEG. 1: LOW WING MODEL C Final Report
William J. Mulcay and Robert A. Rose Washington NASA Oct. 1980 915 p
(Contract NAS1-14849)
(NASA-CR-3200) Avail: NTIS HC A99/MF A01 CSCL 01A

Aerodynamic characteristics obtained in a helical flow environment utilizing a rotary balance located in the Langley spin tunnel are presented in plotted form for a 1/6 scale, single engine, low wing, general aviation model (model C). The configurations tested included the basic airplane and control deflections, wing leading edge and fuselage modification devices, tail designs and airplane components. Data are presented without analysis for an angle of attack range of 8 deg to 90 deg and clockwise and counter clockwise rotations covering an omega b/2v range from 0 to .9. Author

N80-33356*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

CALCULATION OF THREE-DIMENSIONAL UNSTEADY TRANSONIC FLOWS PAST HELICOPTER BLADES

J. J. Chattot Oct. 1980 32 p refs Prepared in cooperation with Army Aviation Research and Development Command, Moffett Field, Calif.

(NASA-TP-1721; A-8024) Avail: NTIS HC A03/MF A01 CSCL 01A

A finite difference code for predicting the high speed flow over the advancing helicopter rotor is presented. The code solves the low frequency, transonic small disturbance equation and is suitable for modeling the effects of advancing blade unsteadiness on blades of nearly arbitrary planform. The method employs a quasi-conservative mixed differencing scheme and solves the resulting difference equations by an alternating direction scheme. Computed results showed good agreement with experimental blade pressure data and illustrate some of the effects of varying the rotor planform. The flow unsteadiness is shown to be an indispensible part of a transonic solution. Close to the tip at high advance ratio, cross flow effects can significantly affect the solution. Author

N80-33357*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

WIND: COMPUTER PROGRAM FOR CALCULATION OF THREE DIMENSIONAL POTENTIAL COMPRESSIBLE FLOW ABOUT WIND TURBINE ROTOR BLADES

Djordje S. Dulikravich Oct. 1980 20 p refs

(NASA-TP-1729; E-474) Avail: NTIS HC A02/MF A01 CSCL 01A

A computer program is presented which numerically solves an exact, full potential equation (FPE) for three dimensional, steady, inviscid flow through an isolated wind turbine rotor. The program automatically generates a three dimensional, boundary conforming grid and iteratively solves the FPE while fully accounting for both the rotating cascade and Coriolis effects. The numerical techniques incorporated involve rotated, type dependent finite differencing, a finite volume method, artificial viscosity in conservative form, and a successive line overrelaxation combined with the sequential grid refinement procedure to accelerate the iterative convergence rate. Consequently, the WIND program is capable of accurately analyzing incompressible and compressible flows, including those that are locally transonic and terminated by weak shocks. The program can also be used to analyze the flow around isolated aircraft propellers and helicopter rotors in hover as long as the total relative Mach number of the oncoming flow is subsonic. A.R.H.

N80-33358*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

A SIMPLE METHOD FOR CONVERTING FREQUENCY DOMAIN AERODYNAMICS TO THE TIME DOMAIN

Earl H. Dowell (Princeton Univ.) Oct. 1980 42 p refs

(NASA-TM-81844; L-13789) Avail: NTIS HC A03/MF A01 CSCL 01A

A simple, direct procedure was developed for converting frequency domain aerodynamics into indicial aerodynamics. The data required for aerodynamic forces in the frequency domain may be obtained from any available (linear) theory. The method retains flexibility for the analyst and is based upon the particular character of the frequency domain results. An evaluation of the method was made for incompressible, subsonic, and transonic two dimensional flows. Author

N80-33359# Calspan Advanced Technology Center, Buffalo, N.Y. Aerodynamic Research Dept.

TRANSONIC SHOCK WAVE - BOUNDARY LAYER INTERACTIONS Final Report

Corso Padova and Theodore J. Falk May 1980 95 p refs

(Contract F44620-76-C-0057; AF Proj. 2307)

(AD-A088831; CALSPAN-AB-5866-A-4; AFOSR-80-0694TR) Avail: NTIS HC A05/MF A01 CSCL 20/4

A series of 2D experiments was performed in a large scale Ludwieg tube to investigate the interactions of a normal shock with a turbulent boundary layer at unit Reynolds numbers 14.8 million and 29.5 million/m and Mach numbers 1.43 and 1.60. In addition, the effects of a diverging flow field downstream of the shock, such as that which might be encountered on an airfoil, were explored by testing with a shock holder having a perforated top wall. The latter experiments were performed at the two Reynolds number values of 9 million and 35 million. Results show that unit Re variations affected the interacting flow only by changing the boundary layer entering the interaction. The surface pressure distribution normalized by the thickness of the incoming boundary layer, which was measured in each experiment, describes an interaction independent of unit Re. In contrast, the interaction flow field was found to be very dependent on Mach number and on constrainment of the subsonic region. In fact, shock configuration, surface pressure, skin friction and velocity profiles were found much more sensitive to these parameters than to the Reynolds number, which was investigated in earlier studies. The bifurcation height and the length of separated flow increased with increasing M. Both quantities responded dramatically to the moderate but sustained flow deflections imposed by the perforated shock holders. The initial rise in surface pressure was found to correlate directly with the height of the bifurcated shock structure. GRA

N80-33360# Michigan Univ., Ann Arbor. Dept. of Aerospace Engineering.

A STUDY OF HYBRID COMPUTING TECHNIQUES FOR TRANSONIC FLOW FIELDS Final Technical Report, 1 Aug. 1978 - 31 Dec. 1979

T. C. Adamson, Jr. and A. F. Messiter Feb. 1980 77 p refs (Grant AF-AFOSR-3635-78; AF Proj. 2307)

(AD-A088662; UMICH-016294-F) Avail: NTIS HC A05/MF A01 CSCL 20/4

Two problems in which analytical solutions might be used to improve the accuracy of or reduce the computation time of numerical computations are considered. In the first, axisymmetric flow at large distances from a slender body is studied for supersonic and transonic speeds, and the length scales for which viscous effects become important are derived in terms of the slenderness parameter and the Reynolds number. An analytical solution is obtained for a case which appears most likely to be important at supersonic speeds. In the second, solutions are derived for transonic flow in a two dimensional channel with a shock wave, at low Reynolds number. A relationship is derived from which the effects of Reynolds number on the position of the sonic line within the shock wave can be found. GRA

N80-33361# Naval Ship Research and Development Center, Annapolis, Md. Aviation and Surface Effects Dept.

AFTERBODY DRAG. VOLUME 3: LITERATURE SURVEY Final Report

George S. Pick and Richard M. Hartley Jun. 1980 96 p refs

(AD-A088938; DTNSRDC/ASED-80/13-Vol-3) Avail: NTIS HC A05/MF A01 CSCL 20/4

A literature survey was conducted as part of the afterbody drag evaluation project. The results of the survey are presented in four sections: (1) discussion of studies by various authors; (2) list of 119 reports considered applicable to the evaluation; (3) summary of the 119 reports in tabular form; and (4) bibliography of open literature (608 reports and papers). GRA

N80-33362# Transportation Systems Center, Cambridge, Mass.

DETECTION AND ASSESSMENT OF SECONDARY SONIC BOOMS IN NEW ENGLAND Final Report

Edward J. Rickley and Allan D. Pierce (Georgia Inst. of Technology, Atlanta) May 1980 137 p refs Sponsored by DOT Prepared for FAA

(AD-A088160; TSC-FAA-80-10; FAA-AEE-80-22) Avail: NTIS HC A07/MF A01 CSCL 20/1

The results of a secondary sonic boom detection and assessment program conducted by the U.S. Department of Transportation, Transportation Systems Center in New England during the summer of 1979 are presented. Measurements of both acoustic and intrasonic signals were made. Measurement data and ray trace computations demonstrate that the secondary sonic booms frequently reported by New England residents are created by the Concorde passenger flight off the New England coast enroute to Kennedy Airport in New York City. Signal amplitudes showed wide fluctuations from flight to flight, from day to day, and with geographic locations. A brief set of

measurements were made in Applebachsville PA, and showed a similar day to day variability and are correlated with Concorde flights into Dulles Airport in Virginia. T.M.

N80-33363# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
SPECIAL COURSE ON UNSTEADY AERODYNAMICS
Jun. 1980 236 p refs Course held in Rhode-Saint-Genese, Belgium, 10-14 Mar. 1980; sponsored by Fluid Dyn. Panel, von Karman Inst., and the Consultant and Exchange Program of AGARD
(AGARD-R-679; ISBN-92-835-1364-9) Avail: NTIS HC A11/MF A01

A wide range of related unsteady flow phenomena relevant to aeronautical applications are addressed. Aircraft response, aircraft loads, vibration environments, and flight systems analysis are emphasized. For individual titles, see N80-33364 through N80-33380.

N80-33364# Queen Mary Coll., London (England). Dept. of Aeronautical Engineering.
SOME INTRODUCTORY CONCEPTS BASED ON THE UNSTEADY FLOW ABOUT CIRCULAR CYLINDERS
G. J. Hancock *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 15 p refs (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

The various categories of unsteady flows which are of current interest in an aircraft context are briefly outlined. The wide range of areas of interest in unsteady aerodynamics are considered with respect to the following: (1) attached flow in subsonic and supersonic streams; (2) attached flow at transonic speeds; (3) separated flows; and (4) self induced unsteady flows. R.C.T.

N80-33365# Virginia Polytechnic Inst. and State Univ., Blacksburg.
INTRODUCTION TO UNSTEADY BOUNDARY LAYERS
D. P. Telionis *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 6 p refs (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

The basic characteristics of transient and oscillatory boundary layers are demonstrated in terms of elementary solutions of the Navier-Stokes equations for idealized flow situations. A qualitative description is given of the physics of unsteady boundary layers, briefly describing the response of skin friction, velocity profiles, the effects of nonlinearity on velocity and temperature fields, etc. The extension of turbulence models to unsteady flow is briefly discussed. Reversing boundary layers and unsteady separation are also briefly described. R.C.T.

N80-33366# Westland Helicopters Ltd., Yeovil (England). Aeromechanics Dept.
A QUALITATIVE DISCUSSION OF DYNAMIC STALL
T. S. Beddoes *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 6 p refs (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

The factors which contribute to the onset of stall are considered with respect to the design of flight vehicles. It is shown that in a dynamic environment, (i.e., guests and manuevering flight) the statically determined loads are likely to be exceeded. An attempt is made to quantify the increase and define percisely the significance of related parameters. R.C.T.

N80-33367# Queen Mary Coll., London (England). Dept. of Aeronautical Engineering.
SOME FEATURES OF LINEAR COMPRESSIBILITY
G. J. Hancock *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 9 p (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

Some of the characteristic features of linear wave propagation in air at rest are described. Several theoretical prediction methods for inviscid flows are presented in the form of linearized equations to demonstrate the small disturbances on a uniform stream. R.C.T.

N80-33368# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik
METHOD FOR INVISCID SUBSONIC FLOWS ABOUT AIRCRAFT CONFIGURATIONS
W. Geissler *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 21 p refs (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

A variety of theoretical as well as experimental methods were used to determined unsteady airloads about complex aircraft configurations. Emphasis was also placed on the derivation of the final integral relations serving as the initial equations for special numerical approaches. R.C.T.

N80-33369# Cambridge Univ. (England). Dept. of Engineering.
UNSTEADY AERODYNAMICS IN TURBOMACHINERY
D. S. Whitehead *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 11 p refs (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

Unsteady flow phenomena in turbomachines, blade flutter, and methods for unsteady cascades are discussed. The phenomena of inlet maldistribution, rotating stall, surge, blade vibration, and sound generation are described. The types of blade flutter and the modes in which it occurs are then examined and a theoretical method of flutter prediction is discussed. The effects of mechanical damping and mistuning are evaluated. A theory of linearized two dimensional unsteady flow in cascades is outlined for both subsonic and supersonic flow. The importance of the two different kinds of acoustic resonance which occur is then discussed. R.C.T.

N80-33370# Westland Helicopters Ltd., Yeovil (England). Aeromechanics Dept.
UNSTEADY FLOWS ASSOCIATED WITH HELICOPTER ROTORS
T. S. Beddoes *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 8 p refs (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

The analytical treatment of helicopter performance and structural loading are addressed with respect to the spacial and temporal variation of the local flow, relative velocity, and angularity. Quassisteady aerodynamics in conjunction with simplified models of rotor inflow and structural characteristics were used to identify many of the fundamental problems which were encountered in the development of a practical vehicle. R.C.T.

N80-33371# Queen Mary Coll., London (England). Dept. of Aeromechanical Engineering.
ROLE OF UNSTEADY AERODYNAMICS IN AIRCRAFT RESPONSE
G. J. Hancock *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 14 p refs (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

Some of the main dynamic situations which arise in aircraft response are illustrated. Major emphasis is placed on overall aircraft performance and structural response. R.C.T.

N80-33372# Westland Helicopters Ltd., Yeovil (England). Aeromechanics Dept.
APPLICATION OF IDENTICAL AERODYNAMIC FUNCTIONS
T. S. Beddoes *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 8 p refs (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

Relatively simple means for applying the theoretical results for idealized forcing to routine calculations of airloads and structural response are demonstrated. In this context nonlinear system characteristics may be simulated and complex or arbitrary forcing may be included. Initially the aerodynamics are assumed to be more or less linear, that is, the flow is assumed to remain attached but the procedure is intended to provide the parameters required to define the onset of separation. E.D.K.

N80-33373# Royal Aircraft Establishment, Bedford (England). Structures Dept.

EXPERIMENTAL TECHNIQUES IN UNSTEADY AERODYNAMICS

N. C. Lambourne *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 26 p refs (For primary document see N80-33363 24-02)

Avail: NTIS HC A11/MF A01

The role of experiments in the field of unsteady aerodynamics and the methods of simulating unsteady conditions with models in wind tunnels, or other facilities, are outlined. The techniques of measuring unsteady quantities such as aerodynamic force and pressure are described, attention being given to the part played by computers in the acquisition, processing, and presentation of measured data. The choices facing the experimenter and some of the phenomena that may be encountered are discussed. Finally, specific examples of test rigs and test procedures are briefly described. E.D.K.

N80-33374# Virginia Polytechnic Inst. and State Univ., Blacksburg.

EXPERIMENTAL TECHNIQUES FOR UNSTEADY BOUNDARY LAYERS c82

D. P. Telionis *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 12 p refs (For primary document see N80-33363 24-02)

Avail: NTIS HC A11/MF A01

Methods of measuring velocity distribution in unsteady viscous flows and techniques for analyzing and presenting the data are discussed. Both hot wires and laser doppler velocimeters were successfully used to investigate unsteady boundary layers. A variety of flow visualization methods ranging from smoke and tuft observation in air to hydrogen bubbles and solid particles in water, were successfully used in the study of complex unsteady flows, as for example the formation and development of large scale vortices. Recently it was attempted to obtain simultaneously velocity measurements at a point and instantaneous flow visualization. Both laminar and turbulent flows with or without pressure gradients were investigated. Such flows, especially turbulent flows and separating flows require special averaging techniques to disclose their basic characteristics. Typical data from flat plate flows with adverse pressure gradients, separating flows, and flows over oscillating airfoils are presented. E.D.K.

N80-33375# Queen Mary Coll., London (England). Dept. of Aeronautical Engineering.

METHODS FOR INVISCID SUBSONIC FLOWS ABOUT UNSTEADY AEROFOILS

G. J. Hancock (British Aerospace Aircraft Group, Bristol, England) and R. Doe *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 10 p refs (For primary document see N80-33363 24-02)

Avail: NTIS HC A11/MF A01

Some of the numerical approaches developed for subsonic flows about two dimensional airfoils are cataloged. Such solutions are useful in their own right, for airfoil results are often used in strip theory approaches in early design stages, but primarily these methods lay down the language and framework for applications in three dimensions. In this paper the flow is assumed to be attached and the boundary layer effects are neglected so the inviscid equations are taken. Although the distinction is artificial, if not misleading, the case of incompressible fluid flow is treated and then secondly the effectn of compressibility are introduced. E.D.K.

N80-33376# Virginia Polytechnic Inst. and State Univ., Blacksburg.

ANALYTICAL METHODS FOR PREDICTION OF UNSTEADY LAMINAR BOUNDARY LAYERS

D. P. Telionis *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 13 p refs (For primary document see N80-33363 24-02)

Avail: NTIS HC A11/MF A01

Oscillatory boundary layers were investigated at first via asymptotic expansions in terms of small parameters like the amplitude or the frequency of oscillation. The pioneering work of Lighthill, Moore, Lin, and others is reviewed and subsequent more sophisticated expansions are described. In the last decade a large number of numerical investigations have appeared. Explicit, implicit methods as well as the well known box-method are described and their relative performance is evaluated. Typical examples are compared with classical experimental data. The definition of unsteady separation and criteria for its prediction have generated a lot of interest in the last decade. Analytical methods are discussed for the prediction of unsteady separation. There is still some disagreement on this point with respect to the appearance of the separation singularity. The arguments of both points of view are presented. E.D.K.

N80-33377# Virginia Polytechnic Inst. and State Univ., Blacksburg.

ANALYTICAL METHODS FOR PREDICTION OF UNSTEADY TURBULENT BOUNDARY LAYERS

D. P. Telionis *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 10 p refs (For primary document see N80-33363 24-02)

Avail: NTIS HC A11/MF A01

Almost all of the models for the closure of the turbulent boundary layer equations were extended for the calculation of unsteady flows. The advantages of introducing more governing equations and, therefore, more arbitrary functions and constants are discussed. Algebraic models prove to be quite successful and very attractive since they involve the most simple procedures for the calculation of turbulent flows. One equation and two equation models were extensively used with a variety of generalizations to account for the unsteadiness of the outer flow. Depending on the specific closure assumption, the character of the equation becomes either parabolic or hyperbolic. Numerical schemes for the solution of such equations were introduced and are referenced. E.D.K.

N80-33378# Westland Helicopters Ltd., Yeovil (England). Aeromechanics Dept.

PREDICTION METHODS FOR UNSTEADY SEPARATED FLOWS

T. S. Beddoes *In* AGARD Spec. Course of Unsteady Aerodyn. Jun. 1980 11 p refs (For primary document see N80-33363 24-02)

Avail: NTIS HC A11/MF A01

Experimental investigations have provided an understanding of the phenomena associated with separated flows, both unsteady and quasi-steady. The development of quantitative analytical methods which enable the importance of geometric and flow parameters to be evaluated was required to apply this understanding to engineering problems. Unfortunately, the potentially more rigourous theories require very considerable computational effort, and to compliement their usefulness for airfoil applications, methods for the simulation of synthesis of experimentally derived characteristics were developed for routine use. These methods are discussed. E.D.K.

N80-33379*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

NUMERICAL SOLUTION TECHNIQUES FOR UNSTEADY TRANSONIC AERODYNAMICS PROBLEMS

William F. Ballhaus and John O. Bridgeman *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 24 p refs (For primary document see N80-33363 24-02)

Avail: NTIS HC A11/MF A01 CSCL 01A

Basic concepts of finite difference solution techniques for unsteady transonic flows are presented. The hierarchy of mathematical forumulations that approximate the Navier-Stokes equations are reviewed. The basic concepts involved in constructing numerical algorithms to solve these formulations are given. Semi-implicit and implicit schemes are constructed and analyzed. The discussion focuses primarily on techniques for solving the low frequency transonic small disturbance equation. This is the simplest formulation that contains the essence of inviscid unsteady transonic flow physics. The low frequency formulation is emphasized here because codes based on this theory can be run in minutes of processor time on currently available computers. Furthermore, numerical techniques involved in solving this simple formulation also apply to the more complicated formulations. Extensions to these formulations are briefly described. An indication of the present capability for solving unsteady transonic flows is provided. Important areas of future research for the

advancement of computational unsteady transonic aerodynamics are described. E.D.K.

N80-33380# British Aerospace Aircraft Group, Bristol (England).
LINEARISED METHODS IN SUPERSONIC FLOW
R. H. Doe *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 19 p refs (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

Following a brief statement of the linearized equations for supersonic potential flow, the essential differences between subsonic and supersonic flow and the concept of the supersonic source are examined. Specializing the time dependence to oscillatory flow, the generalized Green's Theorem for such flows is presented through which the integral equations forming the basis of the numerical methods are developed. The second part of the paper outlines the numerical solution of the integral equations for lifting surfaces. Consideration is also given to the development of panel methods applicable to general configurations of wings and bodies. E.D.K.

N80-33338* National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
THE OBLIQUE WING-RESEARCH AIRCRAFT
William H. Andrews *In* Society of Experimental Test Pilots Tech. Rev., Vol. 15, No. 1 1980 p 4-5 ref (For primary document see N80-33337 24-01)
Avail: Issuing Activity

N80-33616# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
REVERSE PSEUDO-UNSTEADY AERODYNAMIC CALCULATION METHODS
Georges Mesuze *In its* La Rech. Aerospatiale Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 31-40 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 23-30 (For primary document see N80-33613 24-31)
Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

N80-33381*# Human Resources Research Organization, Alexandria, Va.
CIVIL HELICOPTER WIRE STRIKE ASSESSMENT STUDY. VOLUME 1: FINDINGS AND RECOMMENDATIONS Final Report
Clyde H. Tuomela and Mark F. Brennan Oct. 1980 66 p refs (Contract NAS2-10505)
(NASA-CR-152389; HumRRO-FR-MTD(CA)-80-13) Avail: NTIS HC A04/MF A01 CSCL 01C

Approximately 208 civil helicopter wire strike accidents for a ten year period 1970 to 1979 are analyzed. It is found that 83% of the wire strikes occurred during bright clear weather. Analysis of the accidents is organized under pilot, environment, and machine factors. Methods to reduce the wire strike accident rate are discussed, including detection/warning devices, identification of wire locations prior to flight, wire cutting devices, and implementation of training programs. The benefits to be gained by implementing accident avoidance methods are estimated to be fully justified by reduction in injury and death and reduction of aircraft damage and loss. J.M.S.

N80-33382*# McDonnell-Douglas Corp., Long Beach, Calif.
CARGO LOGISTICS AIRLIFT SYSTEMS STUDY (CLASS). VOLUME 5: SUMMARY
R. J. Burby and W. H. Kuhlman Jul. 1980 103 p (Contract NAS1-14948)
(NASA-CR-158951) Avail: NTIS HC A06/MF A01 CSCL 01C

Findings and conclusions derived during the study of freighter aircraft requirements to the year 2008 are summarized. These results represent the stepping off point for the much needed coordinated planning efforts by government agencies, the airlines, the users, and the aircraft manufacturers. The methodology utilized in the investigations is shown. The analysis of the current system encompassed evaluations of the past and current cargo markets and on sight surveys of airport and cargo terminals. The findings that resulted provided the basis for formulating the case study procedures, developing the future scenario, and developing the future cargo market demand. J.M.S.

N80-33383# Committee on Public Works and Transportation (U. S. House).
AVIATION SAFETY: DC-10 CRASH OF MAY 25, 1979
Washington GPO 1979 559 p refs Joint hearings before the Subcomm. on Aviation and the Subcomm. on Oversight and Rev. of the Comm. on Public Works and Transportation
(GPO-54-572) Avail: Subcomm. on Aviation

A long term review of civil aviation safety is presented. The hearings were precipitated by the crash of a DC-10 in Chicago on May 25, 1979. The roles that aircraft manufacturers, airlines, the FAA, and the NSTB have played in civil aviation safety are summarized. The hearings were before the Subcommittee on Aviation in the House of Representatives. T.M.

N80-33384*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ANALYSIS OF GENERAL AVIATION SINGLE-PILOT IFR INCIDENT DATA OBTAINED FROM THE NASA AVIATION SAFETY REPORTING SYSTEM
Hugh P. Bergeron Oct. 1980 16 p refs
(NASA-TM-80206; L-13548) Avail: NTIS HC A02/MF A01 CSCL 01C

Data obtained from the NASA Aviation Safety Reporting System (ASRS) data base were used to determine problems in general aviation single pilot IFR operations. The data examined consisted of incident reports involving flight safety in the National Aviation System. Only those incidents involving general aviation fixed wing aircraft flying under IFR in instrument meteorological conditions were analyzed. The data were cataloged into one of five major problem areas: (1) controller judgement and response problems; (2) pilot judgement and response problems; (3) air traffic control intrafacility and interfacility conflicts; (4) ATC and pilot communications problems; and (5) IFR-VFR conflicts. The significance of the related problems, and the various underlying elements associated with each are discussed. Previous ASRS reports covering several areas of analysis are reviewed. A.R.H.

N80-33385# Simula, Inc., Tempe, Ariz.
AIRCRAFT CRASH SURVIVAL DESIGN GUIDE. VOLUME 3: AIRCRAFT STRUCTURAL CRASHWORTHINESS Final Report, Sep. 1977 - Mar. 1980
D. H. Laananen, G. T. Singley, III, A. E. Tanner, and J. W. Turnbow Aug. 1980 274 p refs
(Contract DAAJ02-77-C-0021; DA Proj. 1L1-62209-AH-76)
(AD-A089104; TR-7821; USARTL-TR-79-22C-Vol-3) Avail: NTIS HC A12/MF A01 CSCL 01/2

This five volume document has been assembled to assist design engineers in understanding the problems associated with the development of crashworthy U.S. Army aircraft. It includes not only a collection of available information and data pertinent to aircraft crashworthiness but suggested design conditions and criteria as well. Volume 3 contains information on the design of aircraft structures and structural elements for improved crash survivability. Current requirements for structural design of U.S. Army aircraft pertaining to crashworthiness are discussed. Principles for crashworthy design are presented in detail for the landing gear and fuselage subject to a range of crash conditions, including impacts that are primarily longitudinal, vertical, or lateral in nature and those that involve more complicated dynamic conditions, such as rollover. Analytical methods for evaluating structural crashworthiness are described. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications*.

N80-33386# National Technical Information Service, Springfield, Va.
TROPOSPHERIC SCATTER COMMUNICATIONS. CITATIONS FROM THE NTIS DATA BASE Progress Report, Jun. 1964 - Jun. 1980
William E. Reed Jul. 1980 229 p Supersedes NTIS/PS-79/0750; NTIS/PS-78/0718
(PB80-812571; NTIS/PS-79/0750; NTIS/PS-78/0718) Avail: NTIS HC $30.00/MF $30.00 CSCL 17G

The research covers data transmission, multiplexing, digital, and microwave systems and equipment. Studies on troposcatter propagation are included. Federally sponsored research as well as some foreign reports are included in the citations. This updated bibliography contains 22 abstracts, 8 of which are new entries to the previous edition. GRA

N80-33387# National Aviation Facilities Experimental Center, Atlantic City, N. J.
TEST AND EVALUATION OF TEXAS INSTRUMENTS SMALL COMMUNITY MICROWAVE LANDING SYSTEM Final Report, Feb. 1977 - Aug. 1978
John Warren May 1980 169 p
(AD-A088852; FAA-NA-79-34; FAA-RD-80-49) Avail: NTIS HC A08/MF A01 CSCL 17/7

The purpose of this program was to test the Texas Instruments (TI) model of time reference scanning beam (TRSB) known as the 'Small Community Airport Microwave Landing System' (SCAMLS) for conformance with the contractual proportional coverage and accuracy specifications. The TI SCAMLS is a prototype system intended to provide approach and landing guidance in a low-cost package to relatively low-density, short-runway feeder and general aviation airports. Flight and static tests determined the azimuth and elevation angular errors of the system. Results indicate that the guidance signals from the TI SCAMLS were within contractual specifications. GRA

N80-33388# Federal Aviation Administration, Atlantic City, N.J. Technical Center.
PRECISION L-BAND DME TESTS Interim Report, May - Nov. 1978
Harold Postal Aug. 1980 43 p
(FAA Proj. 075-725-210)
(AD-A089053; FAA-CT-80-25; FAA-RO-80-74) Avail: NTIS HC A03/MF A01 CSCL 17/7

This phase of the project was performed under Technical Program Document (TPD) 04-109, subprogram 075-725-210. The report covers the findings on system accuracy and stability of the L-Band Precision Distance Measuring Equipment (PDME). The results showed differences in bias under varying conditions of approaches, orbits, radials, and river runs. The 24 hour overall stability of the system was recorded. Further testing should be performed with simulators that have the desired accuracy required for testing a PDME system so that a baseline can be established. GRA

N80-33389# National Technical Information Service, Springfield, Va.
INERTIAL NAVIGATION AND GUIDANCE. CITATIONS FROM THE NTIS DATA BASE Progress Report, Jun. 1976 - Jun. 1980
William E. Reed Jul. 1980 224 p Supersedes NTIS/PS-79/0762; NTIS/PS-78/0735
(PB80-812415; NTIS/PS-79/0762; NTIS/PS-78/0735) Avail: NTIS HC $30.00/MF $30.00 CSCL 17G

The bibliography cites research reports on the design, development, performance, equipment, and applications of inertial navigation and guidance systems. Reports on strapdown systems are included. This updated bibliography contains 217 abstracts, 20 of which are new entries to the previous edition. GRA

N80-33390# National Technical Information Service, Springfield, Va.
OMEGA NAVIGATION SYSTEM. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - May 1980
William E. Reed Jul. 1980 223 p Supersedes NTIS/PS-79/0615; NTIS/PS-78/0556
(PB80-812712; NTIS/PS-79/0615; NTIS/PS-78/0556) Avail: NTIS HC $30.00/MF $30.00 CSCL 17G

The development and utilization of the Omega navigation system are treated in these Federally sponsored research reports. Research on signal propagation, equipment, and operational evaluation is presented. Studies on Differential Omega are also included. This updated bibliography contains 315 abstracts, 17 of which are new entries to the previous edition. GRA

N80-33391# National Telecommunication Information Administration, Annapolis, Md.
SPECTRUM RESOURCE ASSESSMENT IN THE 2.7 TO 2.9 GHz BAND. PHASE 2: LSR DEPLOYMENT IN THE LOS ANGELES AND SAN FRANCISCO AREAS
Robert L. Hinkle Apr. 1980 112 p refs
(PB80-194467; NTIA/Rept-80-38; TR-3) Avail: NTIS HC A06/MF A01 CSCL 17G

The National Telecommunications and Information Administration in the Department of Commerce undertook a detailed program to investigate the feasibility of deploying the Limited Surveillance Radars (LSR) in the 2.7-2.9 GHz band in the Los Angeles and San Francisco areas. The LSR is a Federal Aviation Administration air traffic control radar planned for use at general aviation airports with high traffic density that do not qualify for the longer range Airport Surveillance Radars. The degree of congestion in the band in designated areas in the United States was assessed. GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

N80-33392*# Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.
EVALUATION OF AERO COMMANDER SIDEWALL VIBRATION AND INTERIOR ACOUSTIC DATA: STATIC OPERATIONS
A. G. Piersol, E. G. Wilby, and J. F. Wilby Oct. 1980 92 p refs
(Contract NAS1-14611)
(NASA-CR-159290; BBN-4016) Avail: NTIS HC A05/MF A01 CSCL 01C

Results for the vibration measured at five locations on the fuselage structure during static operations are presented. The analysis was concerned with the magnitude of the vibration and the relative phase between different locations, the frequency response (inertance) functions between the exterior pressure field and the vibration, and the coherent output power functions at interior microphone locations based on sidewall vibration. Fuselage skin panels near the plane of rotation of the propeller accept propeller noise excitation more efficiently than they do exhaust noise. Author

N80-33393*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOADS CALIBRATIONS OF STRAIN GAGE BRIDGES ON THE DAST PROJECT AEROELASTIC RESEARCH WING (ARW-1)
Clinton V. Eckstrom Oct. 1980 51 p refs
(NASA-TM-81889) Avail: NTIS HC A04/MF A01 CSCL 20K

The details of and results from the procedure used to calibrate strain gage bridges for measurement of wing structural loads

for the DAST project ARW-1 wing are presented. Results are in the form of loads equations and comparison of computed loads vs. actual loads for two simulated flight loading conditions.
R.C.T.

N80-33394*# Lockheed-Georgia Co., Marietta.
EVALUATION OF LAMINAR FLOW CONTROL SYSTEM CONCEPTS FOR SUBSONIC COMMERCIAL TRANSPORT AIRCRAFT Final Report
R. F. Sturgeon Sep. 1980 316 p refs
(Contract NAS1-14631)
(NASA-CR-159253; LG80ER-15) Avail: NTIS HC A14/MF A01

Alternatives in the design of laminar flow control (LFC) subsonic commercial transport aircraft for opeation in the 1980's period were studied. Analyses were conducted to select mission parameters and define optimum aircraft configurational parameters for the selected mission, defined by a passenger payload of 400 and a design range of 12, 038 km (6500 n mi). The baseline aircraft developed for this mission was used as a vehicle for the evaluation and development of alternative LFC system concepts. Alternatives in the areas of aerodynamics, structures and materials, LFC systems, leading-edge region cleaning, and integration of auxiliary systems were studied. Relative to a similarly-optimized advanced technology turbulent transport, the final LFC configuration is approximately equal in DOC but provides descreases of 8.2% in gross weight and 21.7% in fuel consumption.
T.M.

N80-33395# Aeronautical Research Labs., Melbourne (Australia).
SEA KING MK. 50 HELICOPTER SONAR DYNAMICS STUDY. A SIMPLIFIED CONTROL SYSTEMS MATHEMATICAL MODEL
Christopher R. Guy Feb. 1979 41 p
(AR-001-607; ARL-Aero-Rept-152) Avail: NTIS HC A03/MF A01

A mathematical model, formulating a simplified version of the control systems used in the Sea King MK. 50 helicopter, is described. The model represents the overall control laws and systems used in the aircraft, although it does not represent each individual element of the control systems. The control systems model, together with models of the dynamics/kinematics and sonar cable/transducer, form the complete model for the Sea King MK. 50 helicopter/sonar dynamics study. Sample results showing the flight behaviour of the complete model are included.
Author

N80-33396*# General Dynamics/Convair, San Diego, Calif.
APPLICATION OF ADVANCED TECHNOLOGIES TO SMALL, SHORT-HAUL AIR TRANSPORTS Final Report
Cliff Adcock, Carl Coverston, and Bill Knapton Sep. 1980 212 p
(Contract NAS2-10267)
(NASA-CR-152364) Avail: NTIS HC A10/MF A01 CSCL 01C

A study was conducted of the application of advanced technologies to small, short-haul transport aircraft. A three abreast, 30 passenger design for flights of approximately 100 nautical miles was evaluated. Higher wing loading, active flight control, and a gust alleviation system results in improved ride quality. Substantial savings in fuel and direct operating cost are forecast. An aircraft of this configuration also has significant benefits in forms of reliability and operability which should enable it to sell a total of 450 units through 1990, of which 80% are for airline use.
L.F.M.

N80-33397*# General Dynamics Corp., Groton, Conn.
STUDY FOR CONCEPTUAL DESIGN OF VEO, VTOL EXHAUST NOZZLE
W. C. Bittrick Jul. 1980 91 p
(Contract NAS2-10127)
(NASA-CR-152388) Avail: NTIS HC A05/MF A01 CSCL 01C

Design requirements for a VEO Wing V/STOL exhaust nozzle with a two dimensional shape and having the capability for upper surface blowing, spanwise blowing, and 90 deg turning of the exhaust flow for VTOL were established. A preliminary design of the nozzle that identified the actuation scheme, key dimensions, the flowpath, and the recommended materials were prepared. The airplane characteristics resulting from integrating the study nozzle were established.
T.M.

N80-33398*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
PILOT/VEHICLE MODEL ANALYSIS OF VISUAL AND MOTION CUE REQUIREMENTS IN FLIGHT SIMULATION Final Report
Sheldon Baron, Roy Lancraft, and Greg Zacharias Washington NASA Oct. 1980 165 p refs
(Contract NAS2-10145)
(NASA-CR-3312; Rept-4300) Avail: NTIS HC A08/MF A01 CSCL 05E

The optimal control model (OCM) of the human operator is used to predict the effect of simulator characteristics on pilot performance and workload. The piloting task studied is helicopter hover. Among the simulator characteristics considered were (computer generated) visual display resolution, field of view and time delay.
Author

N80-33399# Aeronautical Research Labs., Melbourne (Australia).
FATIGUE TESTING OF VAMPIRE WINGS
R. A. Bruton and C. A. Patching Jun. 1979 109 p refs
(ARL/Struc-Rept-378; AR-001-742) Avail: NTIS HC A06/MF A01

The fatigue behavior of a total of 21 port and starboard vampire wings was investigated for a 12 load level programmed loading sequence, representative of an average Australian flight loading spectrum. An additional two wings were subjected to a randomized sequence of these loads. Information on the following aspects is presented: the fatigue life of major components in the wing; the ineffectiveness of replacing Parker-Kalon self-tapping screws in the spar boom with pinned Chobert blind rivets; the increase in fatigue life achieved by replacing the lower spar boom; the residual strength of the cracked structure; the distribution of strain between screwed panels and the spar boom; and the fatigue resistance of glued wooden fuselages.
T.M.

N80-33400# San Diego Aircraft Engineering, Inc., Calif.
CONCEPTUAL POINT DESIGN STUDY OF A NEW CTOL SETOLS CAS AIRCRAFT FOR 1995 IOC Final Report, 7 Mar. - 20 Jun. 1979
P. D. Sorensen, R. L. Bayless, and E. F. Noel 20 Jun. 1979 218 p
(Contract N62269-79-C-0438)
(AD-A088351; NADC-78155-20) Avail: NTIS HC A10/MF A01 CSCL 01/2

A conceptual design of a CTOL SETOLS CAS aircraft has been developed. The significant design feature is the use of a Surface Effect Takeoff and Landing System (SETOLS) in lieu of a normal landing gear. The SETOLS is an integral part of the point design, thereby achieving full design compatibility. This feature provides takeoff and landing capability, on the inflated rubber fabric type trunk installed on the bottom of the fuselage, from any unobstructed area such as water, grass, soil, etc., effective operation is thereby achieved with a Conventional Takeoff and Landing (CTOL) aircraft design in the Close Air Support (CAS) mission from forward bases where time prevents construction and repair of long, hard surface runways. Advanced state-of-the-art design, appropriate for 1995 IOC, has been incorporated. One advanced technology Pratt Whitney STF 529 turbofan is used for propulsion and trunk pressurization.
GRA

N80-33401*# Boeing Vertol Co., Philadelphia, Pa.
VASCOMP 2. THE V/STOL AIRCRAFT SIZING AND PERFORMANCE COMPUTER PROGRAM. VOLUME 6: USER'S MANUAL, REVISION 3 Final Report, Oct. 1979 - Jul. 1980
Allen H. Schoen, Harold Rosenstein, Kaydon Stanzione, and John S. Wisniewski May 1980 627 p refs Revision
(Contracts NAS2-6107; N62269-79-C-0706)
(NASA-CR-163639; AD-A088833; D8-0375-Vol-6-Rev-3)
Avail: NTIS HC A99/MF A01 CSCL 09/2

This report describes the use of the V/STOL Aircraft Sizing and Performance Computer Program (VASCOMP II). The program is useful in performing aircraft parametric studies in a quick and cost efficient manner. Problem formulation and data development

were performed by the Boeing Vertol Company and reflects the present preliminary design technology. The computer program, written in FORTRAN IV, has a broad range of input parameters, to enable investigation of a wide variety of aircraft. User oriented features of the program include minimized input requirements, diagnostic capabilities, and various options for program flexibility. GRA

N80-33402# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Control Dynamics Branch.
FLYING QUALITIES DESIGN CRITERIA Interim Report, Mar. 1979 - Feb. 1980
Robert B. Crombie and David J. Moorhouse AFFDL May 1980 280 p refs Presented at AFFDL Flying Qualities Symp., Wright-Patterson AFB, Ohio, Oct. 1979
(AF Proj. 2403)
(AD-A088629; AFWAL-TR-80-3067) Avail: NTIS HC A13/MF A01 CSCL 01/2

Proceedings are reported of a symposium/workshop held at Wright-Patterson AFB during 9-10 October 1979. The symposium was sponsored by the Flight Dynamics Laboratory as part of a continuing effort to revise and upgrade MIL-F-8785B, 'Military Specification, Flying Qualities of Piloted Airplanes.' Flying Qualities specialists were brought together from both industry and government agencies. Formal and informal presentations, plus workshop discussions, were directed towards discussion of flying qualities design criteria. This report contains a record of the presentations and discussions as submitted by the individual authors. GRA

N80-33403# Bell Helicopter Co., Fort Worth, Tex.
INVESTIGATION OF VIBRATION REDUCTION THROUGH STRUCTURAL OPTIMIZATION Final Report, Aug. 1978 - Mar. 1980
Horace W. Hanson Jul. 1980 95 p refs
(Contract DAAK51-78-C-0011; DA Proj. 1L1-62209-AH-76)
(AD-A088917; BHT-699-099-122; USAAVRADCOM-TR-80-D-13) Avail: NTIS HC A05/MF A01 CSCL 20/11

The purpose of this program was to investigate structural optimization techniques for vibration reduction. The results of a practical evaluation of two such techniques, the Vincent circle method and the forced response strain energy method, are discussed. Initial comparison studies of the two methods based on stiffness parameter variations were conducted using an elastic-line NASTRAN model of the AH-1G helicopter. The forced response strain energy method was then applied to a large complex built-up NASTRAN AH-1G model. This application provided useful comparative data identifying the structural elements considered to be the primary contributors to the response. Realistic structural stiffness changes in these elements were assessed to determine their effect on vibration reduction. The Vincent circle method was further evaluated for mass tuning, damping, and dynamic absorber parameters using the elastic-line model. GRA

N80-33339 Grumman Aerospace Corp., Bethpage, N.Y.
CIRCULATION CONTROL WING (CCW) FLIGHT TESTS
Chuck Sewell *In* Society of Experimental Test Pilots Tech. Rev., Vol. 15, No. 1 1980 p 6-35 (For primary document see N80-33337 24-01)
Avail: Issuing Activity

N80-33340* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NASA GENERAL AVIATION STALL/SPIN FLIGHT TESTING Status Report
James M. Patton, Jr. *In* Society of Experimental Test Pilots Tech. Rev., Vol. 15, No. 1 1980 p 36-49 refs (For primary document see N80-33337 24-01)
Avail: Issuing Activity CSCL 01C

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N80-33404*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEVELOPMENT AND TEST RESULTS OF A FLIGHT MANAGEMENT ALGORITHM FOR FUEL CONSERVATIVE DESCENTS IN A TIME-BASED METERED TRAFFIC ENVIRONMENT
Charles E. Knox and Dennis G. Cannon (Boeing Commercial Airplane Co., Seattle) Oct. 1980 50 p refs
(NASA-TP-1717) Avail: NTIS HC A03/MF A01 CSCL 01D

A simple flight management descent algorithm designed to improve the accuracy of delivering an airplane in a fuel-conservative manner to a metering fix at a time designated by air traffic control was developed and flight tested. This algorithm provides a three dimensional path with terminal area time constraints (four dimensional) for an airplane to make an idle thrust, clean configured (landing gear up, flaps zero, and speed brakes retracted) descent to arrive at the metering fix at a predetermined time, altitude, and airspeed. The descent path was calculated for a constant Mach/airspeed schedule from linear approximations of airplane performance with considerations given for gross weight, wind, and nonstandard pressure and temperature effects. The flight management descent algorithm is described. The results of the flight tests flown with the Terminal Configured Vehicle airplane are presented. T.M.

N80-33405# Dynamics Research Corp., Wilmington, Mass.
DIGITAL AVIONICS INFORMATION SYSTEM (DAIS): LIFE CYCLE COST IMPACT MODELING SYSTEM RELIABILITY, MAINTAINABILITY, AND COST MODEL (RMCM): USER'S GUIDE Final Report
John C. Goclowski, John M. Glasier, Robert H. Kistler, Marjorie A. Bristol, and H. Anthony Baran Aug. 1980 167 p refs
(Contract F33615-75-C-5218; AF Proj. 2051)
(AD-A089045; AFHRL-TR-79-65) Avail: NTIS HC A08/MF A01 CSCL 14/1

This technical report provides guidance to the users of the Reliability, Maintainability, and Cost Model (RMCM). This report contains all information needed for users to interact with the RMCM computer program from a computer terminal. The RMCM and the Training Requirements Analysis Model (TRAMOD) described in AFHRL-TR-78-58(2) are the two computer programs that are part of the Life Cycle Cost Impact MODEL (LCCIM) modeling system. The LCCIM can be used to assess the impact of weapon system characteristics on human resource requirements and life cycle cost. It was developed to provide the Air Force with a better in-house capability to conduct trade-offs between competing design, manpower, and logistics alternatives. The initial application of LCCIM was directed at determining potential impacts of the Digital Avionics Information System (DAIS) concept on system support personnel requirements and life cycle cost. The modeling system is, however, applicable in the development of any new weapon system or the modification of an existing weapon system. The RMCM serves as a powerful tool within the LCCIM for conducting resource requirements, costing, and trade-off analyses. User-oriented, it accepts input data at varying levels of detail during all phases of the weapon system acquisition process. Also, the speed of the interactive RMCM computer program will encourage more trade-off analyses early in the design process, where cost avoidance actions are most effective. The RMCM data processing takes into account the interaction between support requirements and cost parameters. GRA

N80-33406# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
HELICOPTER FLIGHT TEST INSTRUMENTATION
A. Pool, ed., K. C. Sanderson, ed., and Kenneth R. Ferrell (Army Aviation Research and Development Command, Edwards AFB, Calif.) Jul. 1980 46 p refs
(AGARD-AG-160-Vol-10) Avail: NTIS HC A03/MF A01

The helicopter characteristics with which instrumentation must contend with are discussed. Typical tests that are conducted are outlined. Major aircraft components and systems which may be instrumented are listed and suggestions are made for sensors, locations, and installation. Instrumentation requirements are summarized. A sample instrumentation management technique is also presented. T.M.

N80-33407# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
PRESSURE AND FLOW MEASUREMENT
W. Wuest (DFVLR, Goettingen, W. Germany), A. Pool, ed., and K. C. Sanderson, ed. London, Harford House Jul. 1980 137 p refs
(AGARD-AG-160-Vol-11; ISBN-92-835-1368-1) Avail: NTIS HC A07/MF A01

The evolution of flight test instrumentation systems during the last decade reflects the radical changes of electronic measuring techniques. Nevertheless the basic principles of measurement methods are essentially unchanged and the sensors for flow and pressure measurements have experienced only slight changes. The fundamentals of flow and pressure measurements are explained from the viewpoint of flight test instrumentation. An overview of modern instrumentation is given with important applications to altitude measurement, vertical and horizontal speed measurement, boundary layer, wake and engine flow measurement. The scope of this manual is to give self consistent information on the different techniques and systems and to give references for a more detailed study of special techniques.
Author

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N80-33408*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
ENERGY EFFICIENT ENGINE
D. Burrus, P. E. Sabla, and D. W. Bahr Jun. 1980 118 p refs
(Contract NAS3-20643)
(NASA-CR-159685; R79AEG562) Avail: NTIS HC A06/MF A01 CSCL 21E

The feasibility of meeting or closely approaching the emissions goals established for the Energy Efficient Engine (E3) Project with an advanced design, single annular combustor was determined. A total of nine sector combustor configurations and one full-annular-combustor configuration were evaluated. Acceptable levels of carbon monoxide and hydrocarbon emissions were obtained with several of the sector combustor configurations tested, and several of the configurations tested demonstrated reduced levels of nitrogen oxides compared to conventional, single annular designs. None of the configurations tested demonstrated nitrogen oxide emission levels that meet the goal of the E3 Project.
Author

N80-33409*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONCEPTUAL MODEL OF TURBULENT FLAMEHOLDING FOR SCRAMJET COMBUSTORS
Paul W. Huber Oct. 1980 36 p refs
(NASA-TP-1543; L-13600) Avail: NTIS HC A03/MF A01 CSCL 21E

New concepts and approaches to scramjet combustor design are presented. Blowoff was from failure of the recirculation-zone (RZ) flame to reach the dividing streamline (DS) at the rear stagnation zone. Increased turbulent exchange across the DS helped flameholding due to forward movement of the flame anchor point inside the RZ. Modeling of the blowoff phenomenon was based on a mass conservation concept involving the traverse of a flame element across the RZ and a flow element along the DS. The scale required to achieve flameholding, predicted by the model, showed a strong adverse effect of low pressure and low fuel equivalence ratio, moderate effect of flight Mach number, and little effect of temperature recovery factor. Possible effects of finite rate chemistry on flameholding and flamespreading in scramjets are discussed and recommendations for approaches to engine combustor design as well as for needed research to reduce uncertainties in the concepts are made.
Author

N80-33410*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL PERFORMANCE AND ANALYSIS OF 15.04-CENTIMETER-TIP-DIAMETER, RADIAL-INFLOW TURBINE WITH WORK FACTOR OF 1.126 AND THICK BLADING
Kerry L. McLallin and Jeffrey E. Haas Oct. 1980 21 p refs
Prepared in cooperation with Army Aviation Research and Development Command, St. Louis, Mo.
(NASA-TP-1730; E-391; AVRADCOM-TR-80-09) Avail: NTIS HC A02/MF A01 CSCL 21E

The aerodynamic design, the performance, and an internal loss breakdown were examined for a 15.04 cm tip diameter, radial-inflow turbine. The design application was to drive a two stage, 10 to 1 pressure ratio compressor with a mass flow of 0.952 kg/sec and a rotative speed of 70,000 rmp. The turbine inlet temperature was 1478 K, and the turbine was designed with blades thick enough for internal cooling passages. The rotor tip diameter was limited to 86 percent of optimum in order to obtain a reduced tip speed design. The turbine was fabricated with solid, uncooled blading and tested in air at nominal inlet pressure and temperature of 1.379 x 10000 N/sq m and 322.2 K, respectively. Results indicated the turbine total efficiency to be 5.3 points less than design. Analysis of these results has indicated the deficit in performance to be due to stator secondary flow losses, vaneless space surface friction losses, and trailing edge wake mixing losses.
R.C.T.

N80-33411# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio. Performance Branch.
REGRESSION MODELING OF TURBINE ENGINE PERFORMANCE Final Report, Jul. 1974 - Jun. 1977
James R. Ruble and Richard McNally May 1980 79 p refs (AF Proj. 3066)
(AD-A088898; AFWAL-TR-80-2034) Avail: NTIS HC A05/MF A01 CSCL 21/5

This effort examines the use of regression modeling to represent turbine engine performance as a function of Mach number, altitude, power setting, design for pressure ratio and design overall pressure ratio. A model, satisfactory for conceptual analysis work, was constructed and evaluated. A significant reduction in propulsion data generation cost was demonstrated (approximately 15 to 1). Details of the approach are presented along with a discussion of the practicality of such a model.GRA

N80-33412# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
DETERMINATION OF POLLUTANT EMISSIONS CHARACTERISTICS OF GENERAL ELECTRIC CF6-6 AND CF6-50 MODEL ENGINES Final Report, Oct. 1978 - Dec. 1979
T. F. Lyon, W. J. Dodds, and D. W. Bahr Mar. 1980 108 p refs
(Contract DOT-FA78WA-4207)
(AD-A088927; R80AEG420; FAA-EE-80-27) Avail: NTIS HC A06/MF A01 CSCL 21/5

The average levels and the variability of emissions were determined for newly manufactured General Electric CF6-6 and CF6-50 model engines. Emissions of carbon monoxide, hydrocarbons, oxides of nitrogen, and smoke were measured on a total of twenty five engines. Emissions were measured from two separate sampling systems, one sampling in the FAA diamond pattern, and the other in the EPA cruciform pattern. Only small differences in emissions were found between the two sampling patterns. Typical variability in CF6 production engine emissions was found to be somewhat less than had been previously reported for other types of large, turbofan engines. The effect of differences in fuel types, and in idle conditions (hot or cold) on emission levels were also determined.
GRA

N80-33413# General Electric Co., Lynn, Mass.
HIGH BYPASS TURBOFAN COMPONENT DEVELOPMENT. AMENDMENT 1: SMALL FAN REDESIGN Final Report, Jun. - Oct. 1979
H. Mauch, T. Oldakowski, A. Sehra, and D. Weldon Feb. 1980 33 p

(Contract F33615-78-C-2060; AF Proj. 3066)
(AD-A089067; AFWAL-TR-80-2011) Avail: NTIS HC A03/MF A01 CSCL 21/5

The aerodynamic and mechanical redesign of a small, high through-flow, single stage fan rotor to increase its design-point airflow rate was completed. Since the original design exhibited excellent aeromechanical characteristics, the redesign was confined to changes in the blade meanline angle; parameters such as maximum thickness-to-chord ratio, thickness distribution, aspect ratio, and solidity being unchanged from the original design. Procurement of the redesign fan rotor has been completed on schedule, thus fulfilling the requirements of this contract. GRA

N80-33414# ARO, Inc., Arnold Air Force Station, Tenn.
MEASUREMENT OF TURBINE ENGINE TRANSIENT AIRFLOW IN GROUND TEST FACILITIES Final Report, 1 Oct. 1977 - 30 Nov. 1979
S. Wehofer and R. Rivir (APL) AEDC Aug. 1980 77 p refs (AF Proj. 3066)
(AD-A088706; AEDC-TR-80-21) Avail: NTIS HC A05/MF A01 CSCL 14/2

Transient airflow is a primary parameter required to evaluate propulsion system component matching, stability and control, and transient engine performance. Development and verification of techniques to calculate turbine engine transient airflow performance have been a difficult, long-term problem. In this study a turbine engine transient airflow simulator was developed and used to evaluate candidate transient airflow measurement systems. Design criteria and analysis procedures are presented for an engine inlet bellmouth and engine subsonic venturi transient airflow measurement system. The recommended systems have nominal transient airflow measurement uncertainties of 1 percent. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N80-33415*# University of Southern Colorado, Pueblo. School of Applied Science and Engineering Technology.
RAMP: A FAULT TOLERANT DISTRIBUTED MICROCOMPUTER STRUCTURE FOR AIRCRAFT NAVIGATION AND CONTROL Final Technical Report, 1 Oct. 1979 - 1 Oct. 1980
William R. Dunn 1 Oct. 1980 75 p refs
(Grant NAG2-2)
(NASA-CR-163615) Avail: NTIS HC A04/MF A01 CSCL 01C

RAMP consists of distributed sets of parallel computers partioned on the basis of software and packaging constraints. To minimize hardware and software complexity, the processors operate asynchronously. It was shown that through the design of asymptotically stable control laws, data errors due to the asynchronism were minimized. It was further shown that by designing control laws with this property and making minor hardware modifications to the RAMP modules, the system became inherently tolerant to intermittent faults. A laboratory version of RAMP was constructed and is described in the paper along with the experimental results. Author

N80-33416*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LONGITUDINAL STABILITY AND CONTROL IN WIND SHEAR WITH ENERGY HEIGHT RATE FEEDBACK
Joseph Gera Nov. 1980 40 p refs
(NASA-TM-81828; L-13130) Avail: NTIS HC A03/MF A01 CSCL 01C

The longitudinal linearized equations of motion in wind shear were derived for the NASA Terminal Configured Vehicle, a modified Boeing 737 airplane. In addition to the apparent acceleration terms resulting from wind shear, the equations included altitude dependent stability derivatives. A linear analysis of these equations indicates a first order divergence type of instability due to wind shear in which head wind decreased with altitude. Furthermore, this instability cannot be stabilized by attitude control alone. However, attitude control used in combination with an addition feedback loop which consisted of the energy height rate feedback to the throttle proved to be effective in suppressing instability due to wind shear. A brief piloted, real time, nonlinear simulation indicated the desirability of using a display based on the rate of change of energy height rate and of commanded thrust. T.M.

N80-33417# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
DIGITAL FLIGHT CONTROL RESEARCH USING MICROPROCESSOR TECHNOLOGY Annual Technical Report, 1 Feb. 1978 - 31 Jan. 1979
Robert F. Stengel, James C. Seat, and George E. Miller 23 May 1980 153 p refs
(Contract N00014-78-C-0257)
(AD-A089147; MAE-1425; ONR-CR-300-003-1; ATR-1) Avail: NTIS HC A08/MF A01 CSCL 01/4

A digital flight control system based on microprocessor technology was designed, developed, and flight tested in Princeton's Variable Response Research Aircraft VRA. The microprocessor based digital flight control system works in conjunction with the VRA's existing fly-by-wire control system, and is programmed to provide command and stability augmentation control laws formulated through moder control theory. The initial flight control computer program, CAS-1, provides direct, pitch rate, and normal acceleration command modes. The latter two closed-loop control laws are designed using sample d-data linear-quadratic regulator theory. The computer hardware and software are described and initial flight test results are presented. Flight test results are based on two longitudinal manual control tasks tracking at altitude and approach and landing. They demonstrate the effects of varying sampling rate, computation delay, and control resolution on calibrated step response and on pilot opinion ratings. It is concluded that the pilot can provide effective control with lower samping rates and control resolution than might have been anticipated. The limiting values are task dependent, generally lying in the range of 5 to 10 samples per sec and 4 to 8 bit resolution. Flight test results with pure time delay tend to confirm that there is rapid degradation of pilot opinion as the delay increases beyond 0. GRA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

N80-33418*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PLENUM RESPONSE TO SIMULATED DISTURBANCES OF THE MODEL AND FAN INLET GUIDE VANES IN A TRANSONIC TUNNEL
Blair B. Gloss Washington Oct. 1980 26 p refs
(NASA-TM-81869; L-13848) Avail: NTIS HC A03/MF A01 CSCL 14B

In order to aid in the design of the National Transonic Facility (NTF) control system, test section/plenum response studies were carried out in a 0.186 scale model of the NTF high speed duct. Two types of disturbances, those induced by the model and those induced by the compressor inlet guide vanes were simulated. Some observations with regard to the test section/plenum response tests are summarized as follows. A resonance frequency for the test section/plenum area of the tunnel of approximately 50 Hz was observed for Mach numbers from 0.40 to 0.90. However, since the plenum is 3.1 times (based on volume) too large for the scaled size of the test section, care must be taken in extrapolating these data to NTF conditions. The plenum pressure data indicate the existence of pressure gradients in the plenum. The test results indicate that the difference between

test section static pressure and plenum pressure is dependent on test section flow conditions. Plenum response to inlet guide vane type disturbances appears to be slower than plenum response to test section disturbances. T. M.

N80-33419# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
VALIDATION OF THE OPERATING AND SUPPORT COST MODEL FOR AVIONICS AUTOMATIC TEST EQUIPMENT (OSCATE) M.S. Thesis
Joe Hernandes, Jr. Jun. 1980 177 p refs
(AD-A088725; AFIT-LSSR-46-80) Avail: NTIS HC A09/MF A01 CSCL 09/3

The operating and support cost model for Avionics Automatic Test Equipment oscate was previously developed primarily as an evaluation tool for use in the source selection and also in design trade-off studies. This thesis documents the results of the validation of this model. The sources of model data have been identified in detail in order to determine availability and ease future model use. A subjective evaluation of the model reveals it does represent significant operating and support costs and provides a means of evaluating available acquisition alternatives. Model limitations are discussed in terms of their impact on model use. Detail information and data sources, collection methods, and model use are contained in this thesis. GRA

N80-33420# GARD, Inc., Niles, Ill.
ENERGY CONSERVATION AND MANAGEMENT STUDY OF AIRCRAFT HANGARS AT SELECTED AIR FORCE BASES Final Report, Jul. - Dec. 1979
Neil P. Leslie Jan. 1980 101 p
(Contract F08635-79-C-0266; AF Proj. 2103)
(AD-A089075; AFESC/ESL-TR-80-15) Avail: NTIS HC A06/MF A01 CSCL 01/5

Most existing Air Force aircraft hangars were not originally designed to conserve energy according to present criteria. This study determines the sources of energy waste in hangars at three representative bases, quantifies the losses, and analyzes the economic feasibility of various retrofit ideas to reduce losses. GRA

N80-33421# Air Force Human Resources Lab., Williams AFB, Ariz. Operations Training Div.
ADVANCED SIMULATOR FOR PILOT TRAINING: DESIGN OF AUTOMATED PERFORMANCE MEASUREMENT SYSTEM Final Report
John H. Fuller, Wayne L. Waag, and Elizabeth L. Martin Brooks AFB, Tex. Aug. 1980 68 p refs
(AF Proj. 1123)
(AD-A088855; AFHRL-TR-79-57) Avail: NTIS HC A04/MF A01 CSCL 05/9

The objective of this effort was to design and implement an automated performance measurement (APM) system in the Advanced Simulator for Pilot Training (ASPT). This report documents that development effort and describes the current status of the measurement system. It was assumed that superior flying performance in the aircraft or the simulator has several characteristics which are reflected by available flight parameters. These include (1) maintaining certain aircraft state parameters, such as airspeed or altitude, close to some defined criterion value, (2) avoiding excessive rates and acceleration forces so that the maneuver is executed smoothly, (3) accomplishing these objectives with the least amount of effort; that is, by minimizing control inputs, and (4) not exceeding procedural or safety limits established for the maneuver. To date, the following scenarios have been implemented on the ASPT: (1) Transition Tasks Straight and Level, Airspeed Changes, Turns, Climbs/Descents; (2) Takeoff/Approach/Landing Tasks Takeoffs, Tech Order Climbs, Slow Flight, Configuration Changes, Straight-in Approaches, Overhead Patterns, Touch-and-Go's; (3) Instrument Tasks - Rate Climbs/Descents, Vertical S-A, Vertical S-D, GCA, Proceed Direct to VOR; (4) Aerobatics - Aileron Rolls, Barrel Roll, Loop, Split S, Cloverleaf, Cuban 8, Lazy 8; and (5) Formation - Fingertip. GRA

N80-33422# Bell Helicopter Co., Fort Worth, Tex.
VALIDATION OF THE ROTORCRAFT FLIGHT SIMULATION PROGRAM (C81) USING OPERATIONAL LOADS SURVEY FLIGHT TEST DATA Final Report, Nov. 1978 - Nov. 1979
James R. VanGaasbeek Jul. 1980 233 p refs
(Contract DAAJ02-77-C-0003; DA Proj. 1L2-62209-AH-16)
(AD-A089008; BHT-699-099-006; USAAVRADCOM-TR-80-D-4) Avail: NTIS HC A11/MF A01 CSCL 01/3

The Rotorcraft Flight Simulation Program C81 has been used to simulate several test points from the Operational Loads Survey Flight Test Program for an AH-1G helicopter in order to demonstrate program capabilities. The results of those simulations are summarized in this report. Measured and computed performance characteristics and main rotor bending moments and accelerations are compared for steady-state and maneuvering flight conditions. Computed main rotor aerodynamic quantities are compared with test data, in contour-plot form, for level flight conditions. This report also contains a brief description of the flight test program, a detailed description of the creation of the input decks used for the simulations, and a discussion of possible improvements for future test programs. GRA

N80-33423# Air Force Academy, Colo. Frank J. Seiler Research Lab.
EFFECTS OF CRITERIA ON FLIGHT SIMULATION STUDY 1: HEADING DEVIATION TOLERANCE Interim Report, Jan. - Jun. 1980
Mark Nataupsky, John M. Bermudez, and Valentin W. Tirman Jun. 1980 19 p
(AF Proj. 2303)
(AD-A088908; FJSRL-TR-80-0001) Avail: NTIS HC A02/MF A01 CSCL 05/8

Twenty-eight United States Air Force Academy cadets were trained in a GAT-1 flight simulator under one of four experimental groups. The groups were defined first by having heading information either provided by the normal heading indicator or by peripheral lights and second by their being trained on either a 5 deg or a 10 deg heading deviation criterion. All cadets were subjected to four levels of a secondary cognitive task plus a control condition. There were no significant differences for either the main effect of heading indicator type of criterion level of training. The main effect of cognitive task difficulty level was significant for most measures. In addition, the heading indicator type by training criterion level interaction produced significant differences. Each significant interaction accounted for an average of 21% of the total variance. The study seems to indicate that training criteria are important independent variables in complex psychomotor/cognitive flight simulator tasks. GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N80-33424* National Aeronautics and Space Administration, Washington, D. C.
FLTSATCOM-D
20 Oct. 1980 9 p
(NASA-News-Release-80-158; P80-10166) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 22A

A press release concerning the FLTSATCOM-D communications satellite launching is presented. The satellite system and the Atlas Centaur launch vehicle are described. T.M.

N80-33425*# National Aeronautics and Space Administration, Washington, D. C.
THE UNITED STATES SPACE OBSERVATION POLICY
Michele Chevrel Oct. 1980 10 p Transl. into ENGLISH from Les Cahiers de l'OPIT (France), Dossier no. 2, Winter 1979/1980 p 22-25 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-76373) Avail: NTIS HC A02/MF A01 CSCL 22A

The steps pursued since 1978 to establish an operational civil space remote sensing system are outlined. The role of the

National Oceanographic and Atmospheric Agency is defined, and the problems still remaining are discussed. T.M.

N80-33426*# National Aeronautics and Space Administration, Washington, D. C.
MISSION OPERATION REPORT: VOYAGER PROGRAM VOYAGER 1 ENCOUNTER AT SATURN NOVEMBER 12, 1980
12 Nov. 1980 38 p
(NASA-TM-82217; Rept-S-802-77-01/02) Avail: NTIS HC A03/MF A01 CSCL 22A

The planned sequence of events for the Voyager 1 encounter of Saturn is presented. The status of the Voyager flight and ground systems is summarized. The mission success criteria was established. T.M.

N80-33427*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE TELECOMMUNICATIONS AND DATA ACQUISITION REPORT Progress Report, Jul. - Aug. 1980
15 Oct. 1980 155 p refs
(Contract NAS7-100)
(NASA-CR-163808; JPL-PR-42-59) Avail: NTIS HC A08/MF A01 CSCL 22A

Progress in the development and operations of the Deep Space Network along with developments in Earth-based radio technology as applied to geodynamics, astrophysics, and the search for extraterrestrial intelligence are reported. For individual titles, see N80-33428 through N80-33446.

N80-33428*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE TABLE MOUNTAIN 8-mm-WAVELENGTH INTERFEROMETER **c35**
M. A. Janssen, S. Gulkis, E. T. Olsen, B. L. Gary, F. S. Soltis, and N. I. Yamane *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 1-8 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

The system components, performance, and calibration of two element radio interferometer operating at 8.33 mm wavelength are discussed. The interferometer employs a 5.5 m and a 3 m diameter antenna on an east-west baseline of 60 or 120 m, yielding fringe spacings at transit of 28 or 14 in, respectively. The broad intermediate frequency bandpass of 100 to 350 MHz and the system noise temperature of 500 K provide high sensitivity for the measurement of continuum sources. The interferometer has been used for high resolution studies of the planets and the Sun, and it is currently being adapted to study solar flare emissions at high spatial and time resolution. M.G.

N80-33429*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PATTERN MEASUREMENTS OF A LOW-SIDELOBE HORN ANTENNA **c32**
M. A. Janssen, S. Gulkis, S. M. Bednarczyk, H. W. Marlin, and G. F. Smoot (California Univ., Berkeley) *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 8-14 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 20N

The techniques and results of power pattern measurements of a corrugated horn antenna designed for low sidelobes are reported. The power pattern was measured to levels 90 dB below the main beam maximum in both the E- and H-planes. The measured patterns were found to be in good agreement with predictions from existing theory for the performance of corrugated scalar feeds. M.G.

N80-33430*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SETI INSTRUMENT DEVELOPMENT PLAN **c55**
R. B. Crow *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 15-22 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The architecture of the instrument system for the SETI (Search for Extraterrestrial Intelligence) program is briefly described and the development approach used to implement the operational instruments is discussed. The two versions of the instrument system include a target survey instrument to observe at a very high sensitivity a selected set of interesting stars that have particular a priori promise, and a sky survey instrument to observe the entire celestial sphere at a lower sensitivity. The targeted survey utilizes the 305 meter antenna at Arecibo, Puerto Rico, a 64 meter DSN antenna, and other large radio telescopes. The Arecibo instrument provides the highest sensitivity by virtue of the antenna gain. The antenna line feeds cover an instantaneous frequency range of 50 MHz (tunable over 100 MHz), while the multichannel spectrum analyzer/signal detector is capable of analyzing a frequency segment 16 MHz wide with a maximum resolution of 1 Hz. The sky survey employs a listen-only, 34 meter antenna. The SETI breadboard development is also described. M.G.

N80-33431*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A BIMODAL SEARCH STRATEGY FOR SETI **c55**
S. Gulkis, E. T. Olsen, and J. Tarter (California Univ., Berkeley) *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 23-32 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The search strategy and resultant observational plan which was developed to carry out a comprehensive Search for Extraterrestrial Intelligence (SETI) over that portion of the electromagnetic spectrum known as the terrestrial microwave window is described. The limiting sensitivity achieved was parameterized and calculated for Deep Space Network antennas as well as several radio astronomy observatories. A brief description of the instrumentation to be employed in the search and the classes of signals to be looked for is given. One observational goal is to survey the entire sky over a wide range of frequency to a relatively constant flux level. This survey ensures that all potential life sites are observed to some limiting equivalent isotropic radiated power depending upon their distance. A second goal is to survey a set of potential transmission sites selected a priori to be especially promising, achieving very high sensitivity over a smaller range of frequency. M.G.

N80-33432*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ORION S-BAND DATA ACQUISITION FOR S-Y CALIBRATION **c32**
S. C. Wu *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 33-36 ref (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 17I

Error sources in the Operational Radio Interferometry Observing Network (ORION) are addressed. Specifically, the performance of the S-band receiver and the optimum allocation of data volume between S- and X-band observations is studied. It is found that the requirements on the S-band receiver are not very stringent. The system temperature of the ORION S-band receiver has a very small effect on baseline determination accuracy. It is unwise to pay a high cost for an S-band receiver with a low system temperature; a system temperature as high as 240 K is tolerable. Only 20 to 40 percent of data volume is to be allocated to S-band observations for minimum baseline error. The error remains low over a rather wide range of data volume ratio. Hence precise allocation of the 14 pairs of the Mark 3 very long base interferometer data channels between S- and X-band observations is not critical. M.G.

N80-33433*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NETWORK FUNCTIONS AND FACILITIES **c14**
N. A. Renzetti *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 37-39 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

The objectives, functions, and organization of the Deep Space Network are summarized; deep space station, ground communication, and network operations control capabilities are described. Author

N80-33434*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DSN GROUND COMMUNICATIONS FACILITY c32
R. H. Evans *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 40-50 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 17B

A functional description of the Ground Communications Facility (GCF) and its relationships with other elements of the Deep Space Network and the NASA Communications Network is presented together with development objectives and goals and comments on implementation activities in support of flight projects. The voice, teletype, high speed data, wideband data, monitor and control, data records, network log processor, and network communications equipment subsystems are individually examined. M.G.

N80-33435*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE DSN PROGRAMMING SYSTEM c14
A. P. Irvine *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 51-54 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

The Deep Space Network programming system is described by a heuristic model. Interaction with two elements of that system, anomaly reporting and the MBASIC (trademark) language, is described in detail. Feedback from anomaly reporting indicates that the methodology resulted in a low anomaly rate and thereby also provided positive feedback. The need to reduce operating costs prompted the implementation of the MBASIC (trademark) language as a compiler. M.G.

N80-33436*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANNING A DSN SUPPORT SECTION TECHNICAL LIBRARY c14
T. Bailey and C. C. Chatburn *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 55-61 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

The planning procedure being used to establish a technical library for the Deep Space Network support section is described. The inventory and survey methods employed are described and the preliminary results of these methods are discussed. M.G.

N80-33437*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTERNATIONAL SOLAR POLAR MISSION
R. B. Miller *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 62-67 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The key configurations and characteristics of the two International Solar Polar Mission (ISPM) spacecraft are described. The primary mission objectives of the ISPM are to investigate, as a function of solar latitude, the properties of the solar corona, the solar wind, the sun/wind interface, the heliospheric magnetic field, solar and nonsolar cosmic rays, and the interstellar/interplanetary neutral gas and dust. In addition, instrumentation is included to detect the gamma ray bursts; it is hoped to pinpoint the sources of these bursts by using triangulation from each spacecraft and the Earth. E.D.K.

N80-33438*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A STUDY OF THE PROCESSES IN THE RF HYDROGEN GAS DISSOCIATOR c36
L. Maleki *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 68-76 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 20E

The role of the RF gas dissociator in the hydrogen maser is examined. Based on collisional and plasma transport processes, the performance of the source is investigated. It is found that while the complexity of the collisional processes in the RF dissociator prohibits an easily obtained quantitative expression for the performance of the source, it is nevertheless possible to make general inferences concerning the qualitative performance based on collisional effects. An analytical expression for the efficiency of the source in atom production is obtained based on plasma transport processes. On the basis of this study some recommendations are made for the development of more efficient RF hydrogen gas dissociators for use in masers. Author

N80-33439*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EXPERIMENTAL OPTICAL FIBER COMMUNICATIONS LINK c32
G. F. Lutes *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 77-85 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 17B

An optical fiber communications link 1.5 kilometers in length was installed between the Interim Frequency Standard Test Facility and the Timing and Frequency Systems Research Laboratory at JPL. It is being used to develop optical fiber technology for use in the DSN and particularly for precise time and frequency distribution. E.D.K.

N80-33440*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OPEN-LOOP RADIO SCIENCE WITH A SUPPRESSED-CARRIER SIGNAL c32
C. A. Greenhall *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 86-97 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 17B

When a suppressed-carrier signal is squared, the carrier reappears in doubled form. An open-loop receiver can be used to deliver a recording of a band-limited waveform containing this carrier, whose amplitude and phase can be tracked by the radio science experimenter. Author

N80-33441*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NOISE ADDING RADIOMETER PERFORMANCE ANALYSIS c35
C. Stelzried *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 98-106 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

The DSN noise adding radiometer (NAR) measurement accuracy is analyzed. The NAR capability is part of the precision power monitor function recently introduced in the DSN. The potential system noise temperature measurement accuracy is estimated to be about 1.5% with the 1 kelvin noise diode. Performance verification requires comparison noise temperature measurements with the manual Y factor method and routine monitoring of critical elements in the NAR system such as system linearity and noise diode calibration. A technique is presented to calibrate and reduce the effects of the receiving system nonlinearity. Unsatisfactory performance or degradation of these critical NAR elements would require appropriate system upgrading. E.D.K.

N80-33442*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NETWORKS CONSOLIDATION PROGRAM c14
M. L. Yeater, D. T. Herrman, and G. E. Sanner *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 107-120 ref (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

The Networks Consolidation Program (NCP) goals were defined to include the planning, designing, and implementing of a single network of ground tracking stations. The proposed consolidated network is to make use of facilities that are now included in the Goddard Ground Spaceflight Tracking and Data Network as well as the existing JPL Deep Space Network. These facilities are to be combined and modified to provide a consolidated network capable of supporting the set of planetary and Highly Elliptical Earth Orbiter missions that are planned for the Tracking and Data Relay Satellite System era. The history of activities and events that led to the decision to consolidate the NASA ground tracking and data networks are traced. A summary of the management and planning activities that have taken place

at the Jet Propulsion Laboratory, Goddard Space Flight Center, and at the NASA Headquarters Office of Space Tracking and Data Systems, with respect to the NCP, from the time of decision in October 1979 to the present, are discussed. E.D.K.

N80-33443*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DSN SYSTEM PERFORMANCE TEST SOFTWARE c61
F. B. Leppla *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 121-125 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 09B

The software support group of the Deep Space Network support section is continuing the development of system performance test (SPT) software for the Deep Space Network. During the past two and one-half years, test software was developed for a new system, Radio Science, and many new features were added to existing software. Plans are underway for implementation of test software for the very long baseline interferometry system and the network data processing area. A description of the elements of the SPT software is provided. E.D.K.

N80-33444*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TRISCAN: A METHOD OF PRECISION ANTENNA POSITIONING c89
R. C. Bunce *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 126-133 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 03A

The triangle (antenna) scan (TRISCAN) is a method of improving the alignment between the boresight of the Deep Space Network antennas and a particular target, spacecraft, or radio source (star). For stars, the method works in conjunction with the noise adding radiometer and the antenna pointing system to form estimates of the alignment offset coordinates. This information is then used to position the antenna for improved target alignment. A comparison with CONSCAN is included since a CONSCAN study led to TRISCAN development. E.D.K.

N80-33445*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANETARY RADAR c32
R. M. Taylor *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 142-144 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 17I

The radar astronomy activities supported by the Deep Space Network during June, July, and August 1980 are reported. The planetary bodies observed were Venus, Mercury, and the asteroid Toro. Data were obtained at both S and X band, and the observations were considered successful. E.D.K.

N80-33446*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEEP SPACE NETWORK ENERGY PROGRAM c14
S. E. Friesema *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 145-149 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

If the Deep Space Network is to exist in a cost effective and reliable manner in the next decade, the problems presented by international energy cost increases and energy availability must be addressed. The Deep Space Network Energy Program was established to implement solutions compatible with the ongoing development of the total network. E.D.K.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N80-33447 Colorado Univ. at Boulder.
DETERMINATION AND MAINTENANCE OF EARTH ORBITS WITH ARCS OF MINIMUM ALTITUDE VARIATION
Ph.D. Thesis
Sheau-Teh Han 1980 95 p
Avail: Univ. Microfilms Order No. 8021584

A mathematical model of the rotating oblate atmosphere of the Earth provided the formulation of air drag of the Earth's satellite. A convenient form of the model was used to find the approximate solution of the equations of motion. The effect of Earth's oblateness was considered not only in the equations of motion but also in the evaluation of the satellite's altitude. The decay or variation of the elements of the satellite's orbit was evaluated numerically. The initial semimajor axis, eccentricity and argument of periapsis of the satellite's orbit which provide the minimum altitude variation in the first quarter of revolution were found by numerical searching. The approximate explicit formulas for the variations of the orbital elements were obtained in the altitude region from 180 Km to 600 Km. These explicit formulas were used to find all of the orbit except the minimum altitude variation region. Outside of the minimum altitude arc, a trajectory is needed to bring the satellite back to the original position. Dissert. Abstr.

N80-33448*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANALYTIC THEORY OF ORBIT CONTRACTION AND BALLISTIC ENTRY INTO PLANETARY ATMOSPHERES
James M. Longuski and Nguyen Xuan Vinh 1 Sep. 1980 141 p refs
(Contract NAS7-100; Grant NsG-1448)
(NASA-CR-163627; JPL-Pub-80-58) Avail: NTIS HC A07/MF A01 CSCL 22A

A space object traveling through an atmosphere is governed by two forces: aerodynamic and gravitational. On this premise, equations of motion are derived to provide a set of universal entry equations applicable to all regimes of atmospheric flight from orbital motion under the dissipate force of drag through the dynamic phase of reentry, and finally to the point of contact with the planetary surface. Rigorous mathematical techniques such as averaging, Poincare's method of small parameters, and Lagrange's expansion, applied to obtain a highly accurate, purely analytic theory for orbit contraction and ballistic entry into planetary atmospheres. The theory has a wide range of applications to modern problems including orbit decay of artificial satellites, atmospheric capture of planetary probes, atmospheric grazing, and ballistic reentry of manned and unmanned space vehicles. Author

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N80-33449*# Howard Univ., Washington, D. C. Dept. of Mechanical Engineering.
THE DYNAMICS AND CONTROL OF LARGE FLEXIBLE SPACE STRUCTURES. VOLUME 3, PART B: THE MODELLING, DYNAMICS, AND STABILITY OF LARGE EARTH POINTING ORBITING STRUCTURES Final Report
Peter M. Bainum and V. K. Kumar Sep. 1980 71 p refs
(Contract NsG-1414)
(NASA-CR-163612) Avail: NTIS HC A04/MF A01 CSCL 22B

The dynamics and stability of large orbiting flexible beams, and platforms and dish type structures oriented along the local horizontal are treated both analytically and numerically. It is assumed that such structures could be gravitationally stabilized by attaching a rigid light-weight dumbbell at the center of mass by a spring loaded hinge which also could provide viscous damping. For the beam, the small amplitude inplane pitch motion, dumbbell librational motion, and the anti-symmetric elastic modes are all coupled. The three dimensional equations of motion for a circular flat plate and shallow spherical shell in orbit with a two-degree-of

freedom gimballed dumbbell are also developed and show that only those elastic modes described by a single nodal diameter line are influenced by the dumbbell motion. Stability criteria are developed for all the examples and a sensitivity study of the system response characteristics to the key system parameters is carried out. A.R.H.

N80-33433*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NETWORK FUNCTIONS AND FACILITIES
N. A. Renzetti *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 37-39 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

N80-33435*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE DSN PROGRAMMING SYSTEM
A. P. Irvine *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 51-54 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

N80-33436*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANNING A DSN SUPPORT SECTION TECHNICAL LIBRARY
T. Bailey and C. C. Chatburn *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 55-61 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

N80-33442*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NETWORKS CONSOLIDATION PROGRAM
M. L. Yeater, D. T. Herrman, and G. E. Sanner *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 107-120 ref (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

N80-33448*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEEP SPACE NETWORK ENERGY PROGRAM
S. E. Friesema *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 145-149 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N80-33450*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
IMP 8. VOLUME 1: EM FIELD EXPERIMENT Final Report
May 1980 153 p 2 Vol.
(Contract NAS5-11431)
(NASA-CR-160023) Avail: NTIS HC A08/MF A01 CSCL 22A

The electromagnetic fields experiment on IMP-J used two electric dipole antennas and a triaxial search coil magnetic antenna to sense the electric and magnetic field of plasma waves in space. The electric dipole antennas consisted of a fine wire, 0.021 inches in diameter, with a nominal extended tip-to-tip length of 400 ft. The outermost 50 ft. of each element was conducting and the rest of the antenna was covered with an insulating coating. The search coil antennas each consisted of a high mu core with two separate windings of 40,000 turns each to sense ac magnetic fields. The search coils had a length of 18 inches tip-to-tip and are mounted on the end of a boom. The axes of the x prime and y prime search coil antennas were parallel to the x prime and y prime electric antenna axes. T.M.

N80-33451*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
IMP-8. VOLUME 2: SCIENTIFIC SECTION Final Report
May 1980 335 p refs 2 Vol.
(Contract NAS5-11431)
(NASA-CR-160024) Avail: NTIS HC A15/MF A01 CSCL 22A

Results of the analysis of the IMP-8 data, which was collected during the first six and one-half years after launch of the IMP-8 spacecraft are presented. The plasma wave experiment data were processed and are available in an easily accessible summary form. These data continue to provide a valuable source for comparative studies with plasma wave experiments on other spacecraft operating in the solar wind and within the Earth's magnetosphere. T.M.

N80-33452*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
LAUNCH MISSION SUMMARY: FLTSATCOM-D ATLAS/CENTAUR-57
22 Oct. 1980 10 p
(NASA-TM-82213; KSC-GP-15-12) Avail: NTIS HC A02/MF A01 CSCL 22A

The largest and heaviest spacecraft yet to be launched into geosynchronous orbit by an Atlas Centaur launch vehicle, FLTSATCOM D is part of a versatile military satellite communication system which includes terminals at Navy land bases, and on naval aircraft, ships, and submarines. The design and capabilities of the launch vehicle are described as well as those of the satellite. Information relative to launch windows, flight plan, radar and telemetry coverage, selected trajectory information is presented. A brief sequence of flight events is included. A.R.H.

N80-33453*# National Aeronautics and Space Administration, Washington, D. C.
METEOR AND REMOTE SENSING SATELLITES (A COLLECTION OF ARTICLES)
J. Cruette, M. Bled-Charreton, H. Augustin, and R. Lasbleiz Oct. 1980 21 p Transl. into ENGLISH from Les Cah. de l'OPIT (France), no. 2, Winter 1979/1980 p 26-30 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prepared by Office de la Recherche Scientifique et Technique Outre-Mer, France
(Contract NASw-3198)
(NASA-TM-76369) Avail: NTIS HC A02/MF A01 CSCL 22B

Two short articles are presented that discuss satellite observation. Cloud cover interference of infrared photography is discussed. A file of the cloud cover over France is presented. T.M.

N80-33454*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DRAG-FREE ESTIMATION FEASIBILITY STUDY Final Report
D. B. Schaechter, D. G. Carta, D. Noon, J. Parker, and D. Sonnabend 15 May 1980 76 p refs
(Contract NAS7-100)
(NASA-CR-163635; JPL-Pub-80-20) HC A05/MF A01 CSCL 22B

A drag compensation system for solar probes and other spacecraft that require a drag-free capability is presented. Estimation techniques, derived from modern control theory, are proposed. T.M.

N80-33455*# National Aeronautics and Space Administration, John F. Kennedy Space Center, Cocoa Beach, Fla.
LAUNCH MISSION SUMMARY AND TERMINAL COUNTDOWN, DELTA 153 SATELLITE BUSINESS SYSTEMS SATELLITE (SBS-A)
20 Oct. 1980 16 p
(NASA-TM-82212; KSC-GP-15-13) Avail: NTIS HC A02/MF A01 CSCL 22A

A brief summary of the launch vehicle, spacecraft, and mission is contained. Information relative to launch windows, vehicle telemetry coverage, realtime data flow, telemetry coverage by station, selected trajectory information, and a brief sequence of flight events is also included. Author

N80-33458# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
SATNET DEVELOPMENT AND OPERATION. PLURIBUS SATELLITE IMP DEVELOPMENT. REMOTE SITE MAINTENANCE. INTERNET DEVELOPMENT. MOBILE ACCESS TERMINAL NETWORK. TCP FOR THE HP 3000. TCP - TAC Quarterly Technical Report, 1 May - 31 Jul. 1980
R. D. Bressler Aug. 1980 73 p refs
(Contracts MDA903-76-C-0252; N00039-78-C-0405; N00039-79-C-0386; MDA903-80-C-0353; MDA903-80-C-0214; ARPA Order 3214; ARPA Order 3175.17; ARPA Order 3211)
(AD-A089025; BBN-4474; QTR-18) Avail: NTIS HC A04/MF A01 CSCL 22/2

This Quarterly Technical Report describes work on the development of and experimentation with packet broadcast by satellite; on development of Pluribus Satellite IMPs; on a study of the technology of Remote Site Maintenance; on the development of Inter-network monitoring; and on shipboard satellite communications. GRA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

N80-33457*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE OFT LEVEL C NAVIGATION REQUIREMENTS
Sep. 1980 682 p Supersedes TB0-10530 Revised
(NASA-TM-82211; JSC-14713; IN-79-FM-10-Rev-2; TB0-10530) Avail: NTIS HC A99/MF A01 CSCL 17G

Detailed requirements for the orbital operations computer loads, OPS 2, and OPS 8 are given. These requirements represent the total on-orbit/rendezvous navigation baseline requirements for the following principal functions: on-orbital/rendezvous navigation sequencer; on-orbit/rendezvous UPP sequencer; on-orbit rendezvous navigation; on-orbit prediction; on-orbit user parameter processing; and landing Site update. J.M.S.

N80-33458# Naval Ocean Systems Center, San Diego, Calif.
SPACE SHUTTLE SOLID ROCKET BOOSTER RETRIEVAL SYSTEM: FIVE NOSC PAPERS ON SPACE SHUTTLE SUPPORT Technical Report, 1975 - 1979
A. J. Schlosser 10 Jul. 1980 52 p refs Presented at OCEANS 1979 Joint Conf., San Diego, Calif. 17-19 Sep. 1979 Sponsored in part by NASA and the Air Force
(AD-A089060; NOSC/TD-355) Avail: NTIS HC A04/MF A01 CSCL 22/4

A compilation of five papers on shuttle support: Space Shuttle Rocket Booster (SRB) Retrieval Equipments, by AJ Schlosser; The Solid Rocket Dewatering Set, by KR Fishel; The SRB Parachutes and Frustum Retrieval Equipments, by SD Hultberg; The SRB Retrieval Support Craft, by RL Watts; and Contingency Plans and Equipments for SRB Retrieval for Abnormal Conditions, by RE Jones. Authors are members of the NOSC Applied Technology Division, Code 522. GRA

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

N80-33459# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DATA COLLECTION PLATFORMS: A TECHNIQUE FOR SPACE TELEMETRY APPLIED TO SURVEYING AMBIENT PARAMETERS [PLATAFORMA DE COLETA DE DADOS: UMA TECNICA ESPACIAL DE TELEMETRIA APLICADA AO LEVANTAMENTO DE PARAMETROS AMBIENTAIS]
Jose Roberto deOliveira May 1980 14 p refs In PORTUGUESE; ENGLISH summary Presented at 31st Reunion of the Brazilian Soc. for the Progr. of Sci.
(INPE-1743-RPE/139) Avail: NTIS HC A02/MF A01

Phenomenon whose value can be determined by a sensor with an electronic output, are monitored with the use of the Data Collection Platform (DCP) concept. The present systems on board polar orbiting meteorological satellites allow platform location using the Doppler effect with an accuracy of up to 3 km. A DCP was composed of a small transmitter in the 400 MHz band, connected to several sensors through control circuitry. The messages were transmitted in digital form, and each one contained up to 5000 bits of information. The data reception was made by a ground station through a satellite (generally meteorological) as a communications link. The use of satellites allow for the coverage of conventional extensive areas, including points of difficult access not provided with telecommunications means. Author

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N80-33460*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ORBITER THERMAL PRESSURE DROP CHARACTERISTICS FOR SHUTTLE ORBITER THERMAL PROTECTION SYSTEM COMPONENTS: HIGH DENSITY TILE, LOW DENSITY TILE, DENSIFIED LOW DENSITY TILE, AND STRAIN ISOLATION PAD
Pierce L. Lawing and Donna M. Nystrom Oct. 1980 16 p refs
(NASA-TM-81891) Avail: NTIS HC A02/MF A01 CSCL 22B

Pressure drop tests were conducted on available samples of low and high density tile, densified low density tile, and strain isolation pads. The results are presented in terms of pressure drop, material thickness and volume flow rate. Although the test apparatus was only capable of a small part of the range of conditions to be encountered in a Shuttle Orbiter flight, the data serve to determine the type of flow characteristics to be expected for each material type tested; the measured quantities also should serve as input for initial venting and flow through analysis. Author

N80-33461# Lockheed Missiles and Space Co., Palo Alto, Calif.
ACROSS THREE (ACTIVE CONTROL OF SPACE STRUCTURES), PHASE 1 Final Technical Report, 2 Jan. - 30 Sep. 1979
Michall G. Lyons, Jean N. Auburn, Gabriel Margulies, and Narenda K. Gupta May 1980 235 p refs
(Contract F30602-79-C-0087; AF Proj. C654)
(AD-A089142; RADC-TR-80-131) Avail: NTIS HC A11/MF A01 CSCL 22/2

The theory of stability augmentation (active control of vehicle dynamics) for large space structures is developed and tested analytically on a number of strawman configurations including large surveillance and HEL weapons plateforms. It is shown that active control is potentially feasible for micro-vibration stabilization of precision large structures; performance of several experimental breadboards is illustrated to enhance the theory. GRA

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

N80-33462*# Harvard Coll. Observatory, Cambridge, Mass.
COMPUTER ASSISTED PERFORMANCE TESTS OF THE LYMAN ALPHA CORONAGRAPH Final Report, 1 Jun. 1978 - 30 Jun. 1979
W. H. Parkinson and John L. Kohl 30 Jun. 1979 10 p
(Grant NsG-7461)
(NASA-CR-163622) Avail: NTIS HC A02/MF A01 CSCL 14B

Preflight calibration and performance tests of the Lyman Alpha Coronagraph rocket instrument in the laboratory, with the experiment in its flight configuration and illumination levels near those expected during flight were successfully carried out using a pulse code modulation telemetry system simulator interfaced in real time to a PDP 11/10 computer system. Post acquisition data reduction programs developed and implemented on the same computer system aided in the interpretation of test and calibration data. T.M.

N80-33463*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HIGH SPEED LOOKUP TABLE APPROACH TO RADIOMETRIC CALIBRATION OF MULTISPECTRAL IMAGE DATA
W. Lane Kelly, IV, Barry D. Meredith, and William M. Howle
Washington Oct. 1980 16 p
(NASA-TP-1741; L-13893) Avail: NTIS HC A02/MF A01 CSCL 14B

A concept for performing radiometric correction of multispectral image data onboard a spacecraft at very high data rates is presented and demonstrated. This concept utilized a lookup table approach, implemented in hardware, to convert the raw sensor data into the desired corrected output data. The digital lookup table memory was interfaced to a microprocessor to allow the data correction function to be completely programmable. Sensor data was processed with this approach at rates equal to the access time of the lookup table memory. This concept offers flexible high speed data processing for a wide range of applications and will benefit from the continuing improvements in performance of digital memories. Author

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N80-33484 Georgia Inst. of Tech., Atlanta.
EXPERIMENTAL DETERMINATION OF THE ADMITTANCES OF SOLID PROPELLANTS BY THE IMPEDANCE TUBE TECHNIQUE Ph.D. Thesis
Joseph David Baum 1980 138 p
Avail: Univ. Microfilms Order No. 8023758

A modified version of the impedance tube was utilized to measure the admittance and response function of aluminized and nonaluminized burning solid propellants. This technique can determine both the real and imaginary parts of the admittances of various propellants, solid as well as gaseous, over a wide range of frequencies, under identical oscillatory flow conditions at each frequency. In addition, this technique has the capability of determining the acoustic energy losses in the gas phase simultaneously with the measurement of the burning solid propellant surface admittance. A new data reduction procedure was developed to determine the admittance of the tested solid propellants by utilizing the acoustic pressure amplitude and phase data that is measured at discrete points along the walls of the impedance wall. Dissert. Abstr.

N80-33465*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SYNCHRONOUS ENERGY TECHNOLOGY
Sep. 1980 144 p Symp. held in Cleveland, 29-30 Apr. 1980
(NASA-CP-2154; E-469) Avail: NTIS HC A07/MF A01 CSCL 21H

The synchronous technology requirements for large space power systems are summarized. A variety of technology areas including photovoltaics, thermal management, and energy storage, and power management are addressed. For individual titles, see N80-33466 through N80-33475.

N80-33466*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SYNCHRONOUS ENERGY TECHNOLOGY PROGRAM
Robert C. Finke *In its* Synchronous Energy Technol. Sep. 1980 p 1-7 (For primary document see N80-33465 24-20)
Avail: NTIS HC A07/MF A01 CSCL 10B

The power program in NASA and DOD are discussed with emphasis on the technology for future large space power systems. The structure of the synchronous energy technology program is described and the technologies required for future geosynchronous power stations are defined. The output of the program is to be a series of design data documents to provide design information and to trafnsfer the technology to the involved community. R.C.T.

N80-33467*# National Aeronautics and Space Administration, Washington, D. C.
NASA TECHNOLOGY PROGRAM OVERVIEW
J. P. Mullin *In* NASA. Lewis Space Flight Center Synchronous Energy Technol. Sep. 1980 p 9-13 (For primary document see N80-33465 24-20)
Avail: NTIS HC A07/MF A01 CSCL 21C

Various aspects of space power and electric propulsion are illustrated. The following topics are outlined: Photovoltaic power conversion; power management and distribution; chemical energy conversion and storage; thermal to electric conversion; advanced energetics; and synchronous energy technology. R.C.T.

N80-33468*# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
AIR FORCE SPACE POWER TECHNOLOGY PROGRAM
R. Barthelemy, Tom Mahefkey, and Tom Hebblewaite *In* NASA. Lewis Space Flight Center Synchronous Energy Technol. Sep. 1980 p 15-28 (For primary document see N80-33465 24-20)
Avail: NTIS HC A07/MF A01 CSCL 10B

The military spacecraft power subsystem design requirements, developments goals, and planned technology efforts are summarized. The mission drivers of performance (weight and volume), hardening (survivability), autonomy, reliability, and miniaturization influence space mission effectiveness are outlined. The anticipated performance versus power level trends for reactor static conversion systems are illustrated. A conceptual design for a space based radar system is also given. R.C.T.

N80-33469*# National Aeronautics and Space Administration, Washington, D. C.
SPACECRAFT SYSTEM OVERVIEW OF SPACE POWER AT GEOSTATIONARY EARTH ORBIT
Richard F. Carlisle *In* NASA. Lewis Space Flight Center Synchronous Energy Technol. Sep. 1980 p 29-45 (For primary document see N80-33465 24-20)
Avail: NTIS HC A07/MF A01 CSCL 10B

The power requirements at geostationary Earth orbit are discussed. Special design considerations are introduced and power system elements and opportunities for technological improvements are described. R.C.T.

N80-33470*# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
PHOTOVOLTAIC TECHNOLOGY DEVELOPMENT FOR SYNCHRONOUS ORBIT
Henry W. Brandhorst *In its* Synchronous Energy Technol. Sep. 1980 p 45-56 (For primary document see N80-33465 24-20)
Avail: NTIS HC A07/MF A01 CSCL 10A

Accomplishments and expected benefits are summarized for the following efforts: (1) achieving silicon solar cell efficiency of 18% at 200 micron m to 250 micron m thickness; (2) reducing silicon cell radiation damage in geosynchronous orbit after 10 years to less than 15%; (3) demonstrating coplanar back contact 50 micron m thick silicon solar cells with efficiency of 14%; (4) demonstrating the feasibility of a radiation tolerant GaAs concentrator cell; (5) achieving 30% efficient photo conversion in the laboratory; (6) defining candidate concepts for 50% efficient electromagnetic conversion; and (7) demonstrating the technology for protecting arrays capable of > 300W/kg after 10 years in geosynchronous orbit. A.R.H.

N80-33471*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

LARGE SOLAR ARRAYS

William L. Crabtree *In* NASA. Lewis Space Flight Center Synchronous Energy Technol. Sep. 1980 p 57-68 (For primary document see N80-33465 24-20)

Avail: NTIS HC A07/MF A01 CSCL 10A

A spectrophotovoltaic converter, a thermophotovoltaic converter, a cassegrainian concentrator, a large silicon cell blanket, and a high flux approach are among the concepts being investigated as part of the multihundred kW solar array program for reducing the cost of photovoltaic energy in space. These concepts involve a range of technology risks, the highest risk being represented by the thermophotovoltaics and spectrophotovoltaics approaches which involve manipulation to of the incoming spectrum to enhance system efficiency. The planar array (solar blanket) has no technology risk and a moderate payback. The primary characteristics, components, and technology concerns of each of these concepts are summarized. An orbital power platform mission in the late 1980's is being used to allow a coherent technology advancement program in order to achieve a ten year life with maintenance at a capital recurring cost of $30/watt based on 1978 dollars. A.R.H.

N80-33472*# National Aeronautics and Space Administration, Washington, D. C.

THERMAL MANAGEMENT FOR HIGH POWER SPACE PLATFORM SYSTEMS

Richard A. Gualdoni *In* NASA. Lewis Space Flight Center Synchronous Energy Technol. Sep. 1980 p 69-79 (For primary document see N80-33465 24-20)

Avail: NTIS HC A07/MF A01 CSCL 10A

With future spacecraft power requirements expected to be in the order of 100 to 250 kilowatts and orbital lifetimes in the order of five to ten years, new approaches and concepts will be required that can efficiently and cost effectively provide the required heat rejection and temperature control capabilities. A plan was established to develop the commensurate technologies necessary for the thermal management of a high power space platform representative of future requirements and to achieve technology readiness by 1987. The approach taken in developing the program was to view the thermal requirements of the spacecraft as a spacecraft system rather than each as an isolated thermal problem. The program plan proposes 45 technology tasks required to achieve technology readiness. Of this total, 24 tasks were subsequently identified as being pacing technology tasks and were recommended for initiation in FY 1980 and FY 1981. A.R.H.

N80-33473*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

ELECTROCHEMICAL ORBITAL ENERGY STORAGE (ECOES) TECHNOLOGY PROGRAM

Hoyt McBryar *In* NASA. Lewis Space Flight Center Synchronous Energy Technol. Sep. 1980 p 81-95 (For primary document see N80-33465 24-20)

Avail: NTIS HC A07/MF A01 CSCL 10C

The versatility and flexibility of a regenerative fuel cell power and energy storage system is considered. The principal elements of a Regenerative Fuel Cell System combine the fuel cell and electrolysis cell with a photovoltaic solar cell array, along with fluid storage and transfer equipment. The power output of the array (for LEO) must be roughly triple the load requirements of the vehicle since the electrolyzers must receive about double the fuel cell output power in order to regenerate the reactants (2/3 of the array power) while 1/3 of the array power supplies the vehicle base load. The working fluids are essentially recycled indefinitely. Any resupply requirements necessitated by leakage or inefficient reclamation is water - an ideal material to handle and transport. Any variation in energy storage capacity impacts only the fluid storage portion, and the system is insensitive to use of reserve reactant capacity. A.R.H.

N80-33474*# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.

STATUS OF NICKEL-HYDROGEN CELL TECHNOLOGY

Don R. Warnock *In* NASA. Lewis Space Flight Center Synchronous Energy Technol. Sep. 1980 p 97-105 (For primary document see N80-33465 24-20)

Avail: NTIS HC A07/MF A01 CSCL 10C

Nickel hydrogen cell technology has been developed which solves the problems of thermal management, oxygen management, electrolyte management, and electrical and mechanical design peculiar to this new type of battery. This technology was weight optimized for low orbit operation using computer modeling programs but is near optimum for other orbits. Cells ranging in capacity up to about 70 ampere-hours can be made from components of a single standard size and are available from two manufacturers. The knowledge gained is now being applied to the development of two extensions to the basic design: a second set of larger standard components that will cover the capacity range up to 150 ampere-hours; and the development of multicell common pressure vessel modules to reduce volume, cost and weight. A manufacturing technology program is planned to optimize the producibility of the cell design and reduce cost. The most important areas for further improvement are life and reliability which are governed by electrode and separator technology. A.R.H.

N80-33475*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

POWER MANAGEMENT

J. Graves *In* NASA. Lewis Space Flight Center Synchronous Energy Technol. Sep. 1980 p 107-114 (For primary document see N80-33465 24-20)

Avail: NTIS HC A07/MF A01 CSCL 21H

The multihundred kW power system management and a distribution program aims to develop critical components, circuits, and subsystems required to manage the generation, storage, and distribution of energy in large, orbital space systems. To accomplish this objective, a reference system including subsystems for the generation and storage of energy and management of electrical and thermal energy was designed and is being used to assess at the system level the impact of changing various subsystem parameters. A power management subsystem will then be designed. The subsystem is autonomous and based on ground utility systems concepts to the maximum extent possible. An agency power system breadboard is under development for characterizing and verifying the various component and subsystem technology developments. A.R.H.

N80-33476*# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.

BAFFLE APERTURE DESIGN STUDY OF HOLLOW CATHODE EQUIPPED ION THRUSTERS M.S. Thesis Technical Report, 1 Dec. 1979 - 1 Oct. 1980

John R. Brophy, Jr. and Paul J. Wilbur Oct. 1980 78 p refs (Grant NGR-06-002-112)

(NASA-CR-165164) Avail: NTIS HC A05/MF A01 CSCL 21C

A simple theoretical model which can be used as an aid in the design of the baffle aperture region of a hollow cathode equipped ion thruster was developed. An analysis of the ion and electron currents in both the main and cathode discharge chambers is presented. From this analysis a model of current flow through the aperture, which is required as an input to the design model, was developed. This model was verified experimentally. The dominant force driving electrons through the aperture was the force due to the electrical potential gradient. The diffusion process was modeled according to the Bohm diffusion theory. A number of simplifications were made to limit the amount of detailed plasma information required as input to the model to facilitate the use of the model in thruster design. This simplified

model gave remarkably consistant results with experimental results obtained with a given thruster geometry over substantial changes in operating conditions. The model was uncertain to about a factor of two for different thruster cathode region geometries. The design usefulness was limited by this factor of two uncertainty and by the accuracy to which the plasma parameters required as inputs to the model were specified. T.M.

N80-33477# Texas Univ. at Austin. Dept. of Aerospace Engineering and Engineering Mechanics.
FLOWS IN THE ANNULAR REGION WHEN AN UNDEREXPANDED NOZZLE IS EXHAUSTED INTO A STEPPED LAUNCH TUBE Final Report, 1 Mar. 1979 - 30 Sep. 1979
Stanley A. Bouslog and John J. Bertin Redstone Arsenal, Ala. Army Missile Command 1 Mar. 1980 110 p
(Contract DAAK40-79-C-0021)
(AD-A088581; AD-E595021; RL-CR-80-4) Avail: NTIS HC A06/MF A01 CSCL 20/4

An experimental program was conducted in which unheated air was exhausted through a stationary rocket nozzle into a constant area tube launcher modified with a constructive ring. The constrictive ring simulated a constraint which could be a permanent on temporary part of the launch tube. For the first phase of the test program the static wall pressure distribution, upstream and downstream of the ring, and the mass flow rates in the annular gap were measured. Given an underexpanded nozzle, a correlation between the generation blow by, or reverse flow in the annular gap, and the position of the nozzle exit plane relative to the front face of the ring was developed. The flow phenomena present in the launcher for different nozzle positions was also investigated. For the second phase of the test program the static pressure distribution on the surface of the rocket and the mass flow rates in the annular gap were measured. The differential pressure distributions on the rocket were related to the mass flow rate in the annular gap with increasing blow by flow, and with increasing ejector flow. T.M.

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N80-33478*# Applied Medical Technology, Cleveland Heights, Ohio.
TISSUE RESPONSE TO PERITONEAL IMPLANTS Final Report
George J. Picha Jun. 1980 73 p refs
(NASA Order C-33350-D)
(NASA-CR-159817) Avail: NTIS HC A04/MF A01 CSCL 06P

Peritoneal implants were fabricated from poly 2-OH, ethyl methacrylate (HEMA), polyetherurethane (polytetramethylene glycol 1000 MW, 1,4 methylene disocynate, and ethyl diamine), and untreated and sputter treated polytetrafluoroethylene (PTFE). The sputter treated PTFE implants were produced by an 8 cm diameter argon ion source. The treated samples consisted of ion beam sputter polished samples, sputter etched samples (to produce a microscopic surface cone texture) and surface pitted samples (produced by ion beam sputtering to result in 50 microns wide by 100 microns deep square pits). These materials were implanted in rats for periods ranging from 30 minutes to 14 days. The results were evaluated with regard to cell type and attachment kinetics onto the different materials. Scanning electron microscopy and histological sections were also evaluated. In general the smooth hydrophobic surfaces attracted less cells than the ion etched PTFE or the HEMA samples. The ion etching was observed to enhance cell attachment, multinucleated giant cell (MNGC) formation, cell to cell contact, and fibrous capsule formation. The cell responsed in the case of ion etched PTFE to an altered surface morphology. However, equally interesting was the similar attachment kinetics of HEMA verses the ion etched PTFE. However, HEMA resulted in a markedly different response with no MNGC's formation, minimal to no capsule formation, and sample coverage by a uniform cell layer. R.C.T.

N80-33479*# Martin Marietta Corp., Denver, Colo.
EVALUATION AND PREDICTION OF LONG TERM SPACE ENVIRONMENTAL EFFECTS ON NON-METALLIC MATERIALS Quarterly Progress Report
John A. Shepic 8 Oct. 1980 12 p
(Contract NASB-33578)
(NASA-CR-161585; MCR-80-509-Issue-4; QPR-4) Avail: NTIS HC A02/MF A01 CSCL 11G

The effects of prolonged spacecraft materials were determined and the results compared with predicted behavior. The adhesion and dielectric properties of poly-thermalaze and therm-amid magnet wire insulation were studied. The tensile properties of Lexan, polyurethane, polyethelyne, lucite, and nylon were studied well as the flexure and tensile characteristic of Adlock 851, a phenolic laminate. The volume resistivity of Cho-seal, a conductive elastomer was also a examined. Tables showethe time exposed at thermal vacuum, and the high, low, and average MPA and KSI. A.R.H.

N80-33480# National Bureau of Standards, Washington, D.C.
APPLICATION OF SOLIDIFICATION THEORY TO RAPID SOLIDIFICATION PROCESSING Semiannual Technical Report, 1 Oct. 1979 - 31 Mar. 1980
W. J. Boettinger, J. W. Cahn, S. R. Coriell, and J. P. Manning May 1980 58 p refs
(ARPA Order 3751)
(AD-A089006) Avail: NTIS HC A04/MF A01 CSCL 11/2

The semiannual technical report for ARPA Order 3751 covers the period 1 Oct 79 to 31 Mar 80. Work is reported in the following areas of rapid solidification processing: (1) Interface Stability during Rapid Solidification, (2) Eutectic Solidification and the Formation of Metallic Glasses, and (3) Thermodynamics of Metastable Equilibria. GRA

N80-33481# California Inst. of Tech., Pasadena. Div. of Chemistry and Chemical Engineering.
THEORETICAL ASPECTS OF THE MECHANISM OF SIMPLE CHEMICAL REACTIONS Interim Report
Aron Kuppermann 1979 95 p refs Submitted for publication
(Grant AF-AFOSR-3394-77; AF Proj. 2303)
(AD-A088804; AFOSR-80-0609TR) Avail: NTIS HC A05/MF A01 CSCL 07/4

The dynamical theory of chemical reactions is an important and rapidly developing branch of chemical dynamics. Although the first accurate ab initio three dimensional quantum mechanical calculations of the cross sections for a simple chemical reaction have been performed less than five years ago, the theory has already made predictions about the existence of new chemical phenomena, and is providing valuable guidance for the experiments aimed at detecting their existence. Thus, after 40 years of near-dormancy, this field has begun to evolve with startling speed. A knowledge of its foundations has become a necessary background for everybody interested in modern chemical dynamics. In this series of four lectures, we intend to present a general overview of the quantum theory of chemical reactions, including much of the applications done so far. In the first lecture, we willl review the quantum theory of collinear triatomic reactions. In the next two lectures, these considerations will be generalized to three dimensional bimolecular versions, and the results of calculations performed so far presented and analyzed. In the fourth lecture, we will discuss dynamic Feshback resonances in chemical reactions. GRA

24 COMPOSITE MATERIALS

Includes laminates.

N80-33482* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
METHOD OF MAKING BEARING MATERIAL Patent
Harold E. Sliney, inventer (to NASA) Issued 29 Jul. 1980 7 p Filed 31 Jan. 1977 Supersedes N77-32249 (15 - 23, p 3050) Division of abandoned US Patent Appl. SN-616528, filed 25 Sep. 1975, which is a division of US Patent Appl. SN-513611, filed 10 Oct. 1974

(NASA-Case-LEW-11930-3; US-Patent-4,214,905; US-Patent-Appl-SN-764245; US-Patent-Class-75-200; US-Patent-Class-75-222; US-Patent-Appl-SN-616528; US-Patent-Appl-SN-513611) Avail: US Patent and Trademark Office CSCL 11D

A composite material is described which will provide low friction surfaces for materials in rolling or sliding contact and is self lubricating and oxidation resistant up to and in excess of about 930 C. The composite is comprised of a metal component which lends strength and elasticity to the structure, a fluoride salt component which provides lubrication and, lastly, a glass component which not only provides oxidation protection to the metal but may also enhance the lubrication qualities of the composite.

Official Gazette of the U.S. Patent and Trademark Office

N80-33483 British Library Lending Div., Boston Spa (England).
FORMATION OF ORGANOSILICON COMPOUNDS. 58: SYNTHESIS OF A CARBOSILANE WITH PROPELLANE STRUCTURE
G. Fritz and H. J. Vogt 4 Mar. 1979 15 p refs Transl. into ENGLISH from Z. fuer Anorg. und Allgem. Chem. (West Germany), v. 419, no. 1, 1976 p 2-8
(RAE-Lib-Trans-2029(5207)) Avail: British Library Lending Div., Boston Spa, England

A carbosilane with a propellane structure is formed by a coupling reaction of BrSi(CH2SiMe2CH2SiMe2Br)3 (2) with CCl4 and Li. The reaction of C6H5Me2SiCH2Li with ClMe2SiCH2Br leads to C6H5Me2SiCh2SiCH2SiMe2Ch2Br. Metallation with lithium followed by reaction with Cl3SiC6H5 produces compound C6H5Si(CH2SiMe2CH2SiMe2C6H5)3 which then forms (2) by cleavage with bromine. Author

N80-33484 Rice Univ., Houston, Tex.
X-RAY DIFFRACTION STUDY OF THE STRUCTURE OF BORON IN VAPOR-DEPOSITED BORON FIBERS Ph.D. Thesis
Jayant Venkatkrishna Bhardwaj 1980 127 p
Avail: Univ. Microfilms Order No. 8018032

The structure of vapor-deposited fiber boron was studied using X-ray diffraction and computer modeling. The diffraction pattern displayed broad peaks which were interpreted to arise from a microcrystalline material having an average crystallite size of about 30 angitroms. The Debye equation was used to compute the intensity scattered by randomly oriented crystallites. Crystallites with diameter up to 26 angitroms were considered. An additional computer program was written to calculate the different interatomic distances and their multiplicities, and to compute their contributions to the various peaks. This method of analysis was utilized to drive the atoms in the microcrystal towards positions which gave a more favorable fit of the computed intensity profile to the experimentally obtained profile.

Dissert. Abstr.

N80-33485 Virginia Univ., Charlottesville.
AN INVESTIGATION OF THE ELECTROCHEMICAL BEHAVIOR OF GRAPHITE FIBER-POLYMER COMPOSITES Ph.D. Thesis
Gery Ryan Stafford 1980 193 p
Avail: Univ. Microfilms Order No. 8022944

Voltage-time curves were obtained for a number of composite systems to see the effects of fiber orientation, polymer matrix, and fiber properties. Superior voltage stability during ac electrolysis was obtained with composites having a rather low impact strength. The ability to slough damaged and electrically isolated fibers in an effort to expose fresh, active fiber is of utmost importance. Anodic and cycle voltammetry were performed in various electrolytes in an effort to further understand the mechanisms of graphite oxidation. The presence of halogen salt in solution decreases the composite's voltage stability during dc electrolysis. It is shown that a species detrimental to the graphite fiber is produced at the anode, thereby enhancing its oxidation.

Dissert. Abstr.

N80-33486# Massachusetts Inst. of Tech., Cambridge.
DYNAMIC FRACTURES IN ORTHOTROPIC FIBER COMPOSITES Final Report, Dec. 1978 - Dec. 1979
James H. Williams, Jr., Petros N. Kousiounelos, and Samson S. Lee Dec. 1979 369 p refs
(Contract N00019-79-C-0171)
Avail: NTIS HC A16/MF A01

Approximate Mode 1 dynamic stress intensity factors and energy release rates for highly orthotropic 0 deg and 90 deg unidirectional fiber composites are derived in terms of their quasi-static counterparts and a velocity correction factor. Also, the physically realistic Mode 2 problem in 90 deg unidirectional fiber composites is analyzed. It is found experimentally that the long strip configuration subjected to constant extensional displacement can simulate constant crack propagation velocities. Accordingly, the model's dynamic energy release rate was used to determine the dynamic fracture toughness of graphite epoxy composites. The experimentally obtained dynamic fracture toughness was used as input in the analysis of dynamic fracture in double cantilever beam (DCB) specimens under constant pin displacement loading. The predicted crack arrest is compared with experiments on DCB specimens. Closed form analyses of the dynamic fracture and arrest in unidirectional fiber composites were obtained via a double cantilever shear beam model. The case in which the dynamic fracture toughness is independent of crack tip velocity is considered. A.R.H.

N80-33487*# Lockheed-California Co., Burbank.
CARBON/GRAPHITE FIBER RISK ANALYSIS AND ASSESSMENT STUDY: ASSESSMENT OF RISK TO THE LOCKHEED MODEL L-1011 COMMERCIAL TRANSPORT AIRCRAFT Final Report
James Danielides and John R. Koch Feb. 1980 128 p
(Contract NAS1-15509)
(NASA-CR-159201; LR-29338) Avail: NTIS HC A07/MF A01 CSCL 11D

The risk associated with the accidental release of carbon/graphite fibers (CF) from fires on commercial transport aircraft incorporating composite materials was assessed. Data are developed to evaluate the potential for CF damage to electrical and electronic equipment, assess the cost risk, and evaluate the hazard to continued operation. The subjects covered include identification of susceptible equipments, determination of infiltration transfer functions, analysis of airport operations, calculation of probabilities of equipment failures, assessment of the cost risk, and evaluation of the hazard to continued operation. The results show the risks associated with CF contamination are negligible through 1993. J.M.S.

N80-33488*# Douglas Aircraft Co., Inc., Long Beach, Calif.
CARBON/GRAPHITE FIBER RISK ANALYSIS AND ASSESSMENT STUDY: AN ASSESSMENT OF THE RISK TO DOUGLAS COMMERCIAL TRANSPORT AIRCRAFT Final Report
H. C. Schjelderup, C. Q. Cook, E. Snyder, B. Henning, J. Hosford, D. L. Gilles, and C. W. Swanstrom Jan. 1980 75 p
(Contract NAS1-15508)
(NASA-CR-159212) Avail: NTIS HC A04/MF A01 CSCL 11D

The potential hazard to electrical and electronic devices should there be a release of free carbon fibers due to an aircraft crash and fire was assessed. Exposure and equipment sensitivity data were compiled for a risk analysis. Results are presented in the following areas: DC-9/DC-10 electrical/electronic component characterization; DC-9 and DC-10 fiber transfer functions; potential for transport aircraft equipment exposure to carbon fibers; and equipment vulnerability assessment. Results reflect only a negligible increase in risk for the DC-9 and DC-10 fleets either now or projected to 1993. J.M.S.

N80-33489*# Boeing Aerospace Co., Seattle, Wash.
HYBRIDIZED POLYMER MATRIX COMPOSITES Final Report, 2 Aug. 1978 - 2 Nov. 1979
E. E. House, J. T. Hoggatt, and W. A. Symonds 20 Oct. 1980 124 p refs
(NASA-CR-165146; D180-26163-1) Avail: NTIS HC A06/MF A01 CSCL 11D

The extent to which graphite fibers are released from resin matrix composites that are exposed to fire and impact conditions was determined. Laboratory simulations of those conditions that could exist in the event of an aircraft crash and burn situation were evaluated. The effectiveness of various hybridizing concepts

in preventing this release of graphite fibers were also evaluated. The baseline (i.e., unhybridized) laminates examined were prepared from commercially available graphite/epoxy, graphite/polyimide, and graphite/phenolic materials. Hybridizing concepts investigated included resin fillers, laminate coatings, resin blending, and mechanical interlocking of the graphite reinforcement. The baseline and hybridized laminates' mechanical properties, before and after isothermal and humidity aging, were also compared. It was found that a small amount of graphite fiber was released from the graphite/epoxy laminates during the burn and impact conditions used in this program. However, the extent to which the fibers were released is not considered a severe enough problem to preclude the use of graphite reinforced composites in civil aircraft structure. It also was found that several hybrid concepts eliminated this fiber release. Isothermal and humidity aging did not appear to alter the fiber release tendencies. R.C.T.

N80-33490*# Bionetics Corp., Hampton, Va.
EXPERIMENTAL AND ANALYTICAL STUDIES FOR THE NASA CARBON FIBER RISK ASSESSMENT
Aug. 1980 137 p refs
(Contract NAS1-15238)
(NASA-CR-159214) Avail: NTIS HC A07/MF A01 CSCL 11D

Various experimental and analytical studies performed for the NASA carbon fiber risk assessment program are described with emphasis on carbon fiber characteristics, sensitivity of electrical equipment and components to shorting or arcing by carbon fibers, attenuation effect of carbon fibers on aircraft landing aids, impact of carbon fibers on industrial facilities. A simple method of estimating damage from airborne carbon fibers is presented. A.R.H.

N80-33491*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ELECTRONIC EQUIPMENT VULNERABILITY TO FIRE RELEASED CARBON FIBERS
Richard A. Pride, Austin D. McHatton, and Kenneth A. Musselman (Naval Surface Weapons Center, Dahlgren, Va.) Sep. 1980 83 p refs
(NASA-TM-80219) Avail: NTIS HC A05/MF A01 CSCL 11D

The vulnerability of electronic equipment to damage by carbon fibers released from burning aircraft type structural composite materials was investigated. Tests were conducted on commercially available stereo power amplifiers which showed that the equipment was damaged by fire released carbon fibers but not by the composite resin residue, soot and products of combustion of the fuel associated with burning the carbon fiber composites. Results indicate that the failure rates of the equipment exposed to the fire released fiber were consistent with predictions based on tests using virgin fibers. R.C.T.

N80-33492*# TRW Defense and Space Systems Group, Redondo Beach, Calif.
CARBON FIBER PLUME SAMPLING FOR LARGE SCALE FIRE TESTS AT DUGWAY PROVING GROUND
A. R. Chovit, P. Lieberman, D. E. Freeman, W. C. Beggs, and W. A. Millavec Mar. 1980 173 p refs
(Contract NAS1-15465)
(NASA-CR-159215; TRW-80-03) Avail: NTIS HC A08/MF A01 CSCL 11D

Carbon fiber sampling instruments were developed: passive collectors made of sticky bridal veil mesh, and active instruments using a light emitting diode (LED) source. These instruments measured the number or number rate of carbon fibers released from carbon/graphite composite material when the material was burned in a 10.7 m (35 ft) dia JP-4 pool fire for approximately 20 minutes. The instruments were placed in an array suspended from a 305 m by 305 m (1000 ft by 1000 ft) Jacob's Ladder net held vertically aloft by balloons and oriented crosswind approximately 140 meters downwind of the pool fire. Three tests were conducted during which released carbon fiber data were acquired. These data were reduced and analyzed to obtain the characteristics of the released fibers including their spatial and size distributions and estimates of the number and total mass of fibers released. The results of the data analyses showed that 2.5 to 3.5 x 10 to the 8th power single carbon fibers were released during the 20 minute burn of 30 to 50 kg mass of initial, unburned carbon fiber material. The mass released as single carbon fibers was estimated to be between 0.1 and 0.2% of the initial, unburned fiber mass. J.M.S.

N80-33493*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INFLUENCE OF QUALITY CONTROL VARIABLES ON FAILURE OF GRAPHITE/EPOXY UNDER EXTREME MOISTURE CONDITIONS
Linda L. Clements (Advanced Research and Applications Corp., Sunnyvale, Calif.) and Pauline R. Lee Oct. 1980 24 p refs
(NASA-TM-81246; A-8382) Avail: NTIS HC A02/MF A01 CSCL 11D

Tension tests on graphite/epoxy composites were performed to determine the influence of various quality control variables on failure strength as a function of moisture and moderate temperatures. The extremely high and low moisture contents investigated were found to have less effect upon properties than did temperature or the quality control variables of specimen flaws and prepreg batch to batch variations. In particular, specimen flaws were found to drastically reduce the predicted strength of the composite, whereas specimens from different batches of prepreg displayed differences in strength as a function of temperature and extreme moisture exposure. The findings illustrate the need for careful specimen preparation, studies of flaw sensitivity, and careful quality control in any study of composite materials. Author

N80-33494*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROCESS MODIFICATIONS FOR IMPROVED CARBON FIBER COMPOSITES: ALLEVIATION OF THE ELECTRICAL HAZARDS PROBLEM
Kumar Ramohalli 15 Jun. 1980 116 p refs
(Contract NAS7-100)
(NASA-CR-163631; JPL-Pub-80-56) Avail: NTIS HC A06/MF A01 CSCL 11D

Attempts to alleviate carbon-fiber-composite electrical hazards during airplane crash fires through fiber gasification are described. Thermogravimetric and differential scanning calorimetric experiments found several catalysts that caused fibers to combust when composites were exposed to test fires. Composites were tested in the 'Burn-Bang' apparatus and in high voltage electrical detection grid apparatus. In a standard three minute burn test modified composites released no fibers, while state-of-the-art composites released several hundred fiber fragments. Expected service life with and without catalytic modification was studied and electron microscopy and X-ray microanalysis furnished physical appearance and chemical composition data. An acrylic acid polymer fiber coating was developed that wet the carbon fiber surface uniformly with the catalyst, providing a marked contrast with the uneven coats obtained by solution-dipping.S.F.

N80-33495*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
INFLUENCE OF STRESS INTERACTION ON THE BEHAVIOR OF OFF-AXIS UNIDIRECTIONAL COMPOSITES
Marek-Jerzy Pindera and Carl T. Herakovich Sep. 1980 28 p refs Presented at the 2d USA-USSR Symp. on Fracture of Composite Mater., 3-5 Sep. 1980
(Contract NCC1-15)
(NASA-CR-163618; VPI-E-80-26; IR-21) Avail: NTIS HC A03/MF A01 CSCL 11D

The yield function for plane stress of a transversely isotropic composite lamina consisting of stiff, linearly elastic fibers and a von Mises matrix material is formulated in terms of Hill's elastic stress concentration factors and a single plastic constraint parameter. The above are subsequently evaluated on the basis of observed average lamina and constituent response for the Avco 5505 boron epoxy system. It is shown that inclusion of residual stresses in the yield function together with the incorporation of Dubey and Hillier's concept of generalized yield stress for anisotropic media in the constitutive equation correctly predicts the trends observed in experiments. The incorporation of the strong axial stress interaction necessary to predict the correct trends in the shear response is directly traced to the

high residual axial stresses in the matrix induced during fabrication of the composite. Author

N80-33496*# General Dynamics/Convair, San Diego, Calif.
TIME-TEMPERATURE-STRESS CAPABILITIES OF COMPOSITE MATERIALS FOR ADVANCED SUPERSONIC TECHNOLOGY APPLICATION, PHASE 1
J. R. Kerr and J. F. Haskins Apr. 1980 456 p refs
(Contract NAS1-12308)
(NASA-CR-159267; GDC-MAP-80-001) Avail: NTIS HC A20/MF A01 CSCL 11D

Implementation of metal and resin matrix composites into supersonic vehicle usage is contingent upon accelerating the demonstration of service capacity and design technology. Because of the added material complexity and lack of extensive service data, laboratory replication of the flight service will provide the most rapid method of documenting the airworthiness of advanced composite systems. A program in progress to determine the time temperature stress capabilities of several high temperature composite materials includes thermal aging, environmental aging, fatigue, creep, fracture, and tensile tests as well as real time flight simulation exposure. The program has two parts. The first includes all the material property determinations and aging and simulation exposures up through 10,000 hours. The second continues these tests up to 50,000 cumulative hours. Results are presented of the 10,000 hour phase, which has now been completed. A.R.H.

N80-33497*# Boeing Co., Seattle, Wash.
LARC-13 ADHESIVE DEVELOPMENT Final Report, Oct. 1978 - Jun. 1980
S. G. Hill, C. H. Sheppard, and J. C. Johnson Jun. 1980 50 p refs
(Contract NAS1-15562)
(NASA-CR-159317; Rept-2-3621) Avail: NTIS HC A03/MF A01 CSCL 11A

An improved adhesive for 589 K (600 F) use was developed by modifying the base LARC-13 formula. Four resins were synthesized by partial substitution of m,m'-methylene dianiline and then further modified, chemically characterized, and evaluated as adhesives in lap-shear and crack extension tests. Three amide-imide copolymers were also evaluated. The parameters of film thickness, film B-staging, and cure conditions were studied for their effect on bond strength of titanium-bonded lap shear specimens at room temperature and 589BK. Surface pretreatment of titanium bonding was investigated. Crack extension, lap-shear, 'T' peel, and flatwise tensile specimens were fabricated and tested to determine bond properties and the effect of thermal aging on bond strength. The data obtained with the improved adhesive system indicate it would meet the 589 K (600 F) properties desired for application on space shuttle components. Average titanium lap shear data were: (1) 21.1 MPa (3355 psi) at RT; (2) 13.0 MPa (1881 psi) at 600 F; and (3) 16.4 MPa (2335 psi) after aging 125 hours at 600 F and tested at 600 F. A.R.H.

N80-33498# Pennsylvania State Univ., University Park. Materials Research Lab.
MECHANISMS OF EROSION Final Report, 1 Apr. 1977 - 31 May 1980
Norman H. Macmillan Aug. 1980 228 p refs
(Contracts DAAG29-79-C-0104; DAAG29-77-C-0100)
(AD-A088571; ARO-14084.13-MS) Avail: NTIS HC A11/MF A01 CSCL 07/4

A single stage gas gun and a whirling arm rig were used to study the erosion of mono- and poly-crystalline MgO and Al and mono-crystalline LiF targets by millimeter scale steel and WC - 6% Co spheres. The resultant damage was variously studied by optical and scanning electron microscopy, dislocation etching and surface profilometry, and the corresponding mass losses were determined gravimetrically. A computer model of oblique impact was developed and tested against the experimental observations. Results show that the variation of impact crater dimensions with impact to relate mass loss to crater geometry in quantitative terms under either single or multiparticle impact conditions. They also suggest that the erosion of semibrittle materials is determined primarily by the intersection of the lateral and median (or radial) cracks formed about the impact craters, and that ductile materials erode by the detachment of thin platelets formed by extrusion of piled-up material between subsequently arriving particles and the underlying substrate. GRA

N80-33499# Ohio State Univ., Columbus. Research Foundation.
CONDUCTION HEAT TRANSFER ANALYSIS IN COMPOSITE MATERIALS Final Report, 1 Jul. 1978 - 30 Jun. 1979
Lit S. Han and Andrew A. Cosner Mar. 1980 153 p refs
(Grant AF-AFOSR-3640-78; AF Proj. 2307)
(AD-A088741; AFWAL-TR-80-3012) Avail: NTIS HC A08/MF A01 CSCL 11/4

With anticipated increased use of composite materials in aerospace structures and other applications, thermal properties of composites are needed as essential design information. In the past there was only scanty amount of research effort in thermal analysis of composites, as most of the work has been concerned with their mechanical properties. This report contains results from a rigorous analysis to determine steady state effective thermal conductivities of fiber-matrix type of composites. The fibers bundled into twos are considered dispersed in a matrix of resin. The dispersion patterns of configurations considered are: (1) uni-directional fibers in a matrix, as the simplest geometry, and (2) 0,90 configuration in which two unidirectional tapes are overlaid at 90 degrees to each other. The method of analysis is to solve a two region steady state heat conduction equation either analytically or numerically. The analysis assumes a prior knowledge of the geometry of a composite and the constituents thermal conductivities. GRA

N80-33500# Pennsylvania Univ., Philadelphia. Dept. of Materials Science and Engineering.
FATIGUE FAILURE CRITERIA FOR UNIDIRECTIONAL FIBER COMPOSITES
Zvi Hashin Aug. 1980 33 p refs
(Contract N00014-78-C-0544)
(AD-A088733; TR-5) Avail: NTIS HC A03/MF A01 CSCL 11/4

Three dimensional fatigue failure criteria for unidirectional fiber composites under states of cyclic stress are established in terms of quadratic stress polynomials which are expressed in terms of the transversely isotropic invariants of the cyclic stress. Two distinct fatigue failure modes, fiber mode and matrix mode, are modelled separately. Material information needed for the failure criteria are the S-N curves for single stress components. A preliminary approach to incorporate scatter into the failure criteria is presented. GRA

N80-33501# United Technologies Research Center, East Hartford, Conn.
EVALUATION OF AMORPHOUS RIBBON REINFORCED RESIN MATRIX COMPOSITES Final Report, 31 Jul. 1978 - 30 Apr. 1980
James R. Strife and Karl M. Prewo 30 Apr. 1980 186 p refs
(Contract F33615-78-C-5063; AF Proj. 2419)
(AD-A089102; UTRC/R-80-914389-18; AFWAL-TR-80-4060) Avail: NTIS HC A09/MF A01 CSCL 11/4

Ribbon reinforced composites are attractive as structural materials since relatively isotropic in-plane properties are achieved if the ribbon aspect ratio is sufficiently high. Recent advances in the production of amorphous metal ribbons on a continuos basis have resulted in a ribbon material which exhibits unique properties and is potentially low cost. Commercially available amorphous metal ribbon materials were used in this investigation to reinforce resin matrices. Typical ribbon properties were a density of 8.02 gm/cc, tensile strengths in the range of 2550-2900 MPa, tensile modulus of 165 GPa, and aspect ratios, w/t, up to 380. The longitudinal properties of the composites developed were in agreement with the simple rule of mixtures. The transverse composite properties were dependent on ribbon aspect ratio and the ribbon stacking pattern. The composites developed were compared on a specific property basis to currently used quasi-isotropic graphite/epoxy. It was demonstrated that amorphous metal ribbon reinforced resins are competitive with quasi-isotropic graphite/epoxy on a specific strength basis. However, amorphous metal ribbon reinforced resins are not

competitive on a specific modulus basis. Due to the relatively invariant nature of the specific modulus of amorphous metal ribbon materials, no improvement is expected in this regard. It was concluded that these composites would not be in a competitive position for most high performance composite applications, particularly in the aerospace industry. GRA

N80-33502# Hughes Research Labs., Malibu, Calif.
SILICON GERMANIUM ALLOYS FOR INFRARED DETECTORS Final Report, 15 Aug. 1977 - 14 Aug. 1979
H. Winston, H. Kimura, and R. Baron Apr. 1980 60 p refs
(Contract F33615-77-C-5052; AF Proj. 2306)
(AD-A088732; AFWAL-TR-80-4031) Avail: NTIS HC A04/MF A01 CSCL 17/5

Silicon-germanium alloys in the range of 10 at .% Ge have been prepared by Czochralski growth. Material that was not intentionally doped exhibited resistivities as high as 1700 ohm-cm, but, because of the uptake of boron impurities from the crucible during growth, higher resistivities could not be achieved. Therefore, even though the alloys had absorption coefficients for 1.06 micron radiation around 50 per cm (in contrast to 14 per cm for silicon), they were not well suited to preparing p-i-n detectors for 1.06 micron applications because the resistivities were too low to provide suitable long depletion regions. We prepared some alloy crystals by a crucible-free process (which would lead to high resistivity) akin to float zoning. The maximum Ge content achieved was about 2.5 at .%; while this value could be increased by equipment modification and process development, a fundamental drawback of the method is an axial variation of the germanium content as the germanium initially present in the zone is depleted. Measurements of minority carrier diffusion lengths in device structure made of p-type Si-Ge and of p-type Si showed essentially equivalent recombination life-times for both materials as processed to make the devices; the lifetime values were close to 100 nsec. At room temperature, the mobility in p-type Si-Ge is degraded by 10 to 20% from the Si value. At cryogenic temperature, the mobility reduction is much larger, but is consistent with the disorder scattering estimate from room temperature measurements. GRA

N80-33503# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
CATALYTIC INCINERATION OF GRAPHITE FIBERS IN A GRAPHITE-EPOXY COMPOSITE FIRE Interim Report
Kenneth G. Clark 20 May 1980 55 p refs
(Contract N00019-79-WR-91472; WF54591201)
(AD-A088897; NADC-80079-60) Avail: NTIS HC A04/MF A01 CSCL 11/4

As the use of graphite-reinforced composites grows, so does the risk of electrical interference caused by free graphite fibers which might be liberated from composite fires. Graphite oxidation catalysts or combustion promoters were evaluated to determine the extent to which they would cause graphite fibers to incinerate during a composite fire. Lead catalysts (PbO and Pb3O4) proved effective in reducing graphite/epoxy composite specimen weights by more than 90% when ignited. However, these results depend heavily on good draft, small conductive and convective heat losses, thin specimens and good catalysts distribution. Additional work is underway to find alternatives to the toxic lead oxides. GRA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics*.

N80-33504 British Library Lending Div., Boston Spa (England).
THE DETERMINATION OF UNI AND TRI VALENT GOLD IN ACID GOLD BATHS
A. Knoedler Aug. 1980 15 p refs Transl. into ENGLISH from Metalloberflache (Munich), v. 33, no. 7, 1979 p 269-272 (BLL-RTS-12157) Avail: British Library Lending Div., Boston Spa, England

A method for potentiometric determination of KAu(CN)2 is described. This method was used for determination of gold in electroplating baths. T.M.

N80-33505 British Library Lending Div., Boston Spa (England).
REGENERATIONS OF CRITICAL PROCESS SOLUTIONS RELATIVE TO RECOVERIES OF VALUABLE SUBSTANCES
H. Dengler Aug. 1980 15 p refs Transl. into ENGLISH from Galvanotehnik (West Germany), v. 70, no. 7, 1979 p 604-609 (BLL-RTS-12141) Avail: British Library Lending Div., Boston, Spa, England

Waste water solutions produced during the manufacture of circuit boards are discussed. Various methods of recovering valuable metals from this waste water are presented. L.F.M.

N80-33506 British Library Lending Div., Boston Spa (England).
SELECTIVE ELECTROPLATING PROCESSES
M. J. Hacker May 1980 33 p Transl. into ENGLISH from Metalloberflache (West Germany), v. 33, no. 4, 1979 p 137-145
(BLL-RTS-11960) Avail: British Library Lending Div., Boston Spa, England

The growing demand for components plated with noble metals, in conjunction with steeply rising gold prices, is making the traditional plating processes too expensive. The processes available for reducing metal consumption include tip plating with a controlled depth of immersion, gold strip plating, gold filler plating, the commercial and highly specialized spot plating process and selective high speed plating. These processes offer high throughput rates, low investment costs and improvements in the uniformity, reproducibility and quality of the deposits. The consumption of noble metals is appreciably lower than in the conventional frame, drum and entire strip plating processes. R.K.G.

N80-33507 Northeastern Univ., Boston, Mass.
TRACE ANALYSIS OF ANTIMONY BY DIFFERENTIAL PULSE ANODIC STRIPPING VOLTAMMETRY Ph.D. Thesis
Pai-Ti Betty Cheng 1980 121 p
Avail: Univ. Microfilms Order No. 8023638

The difficulty in the analysis of antimony is the oxidation state change between antimony (5) and antimony (3). Antimony (5) and antimony (3) both form a number of complexes with hydroxide and halide among which only the complexes of antimony (3) are electroactive in normal electrolyte media. Differential pulse anodic stripping voltammetry is an electrochemical technique which preconcentrates the analyte and thus enhances the signal to noise ratio. Studies were undertaken to complete a methodology for trace level antimony samples. The effects of various electrolytes and the necessity of pH control are demonstrated. The behavior of antimony in different electrolyte media was studied using UV spectrophotometric and polarographic techniques both of which show the presence of antimony (3) and antimony (5) complexes. Dissert. Abstr.

N80-33508 Virginia Univ., Charlottesville.
ASPECTS OF IONIZATION AND SPUTTERING IN THE GLOW DISCHARGE BY SOLIDS MASS SPECTROMETRY Ph.D. Thesis
Bryan Lloyd Bentz 1980 345 p
Avail: Univ. Microfilms Order No. 8022684

A simplified and relatively inexpensive solids mass spectrometer is described and developed for trace element analysis of bulk conducting solids and solution residues. The unit consists of a glow discharge ion source coupled to a quadrupole mass filter. Design aspects of sampling a 1 Torr sputter discharge, including the hollow cathode design, are presented, in addition to examples illustrating the operating performance of the mass spectrometer. Dissert. Abstr.

N80-33509 Cornell Univ., Ithaca, N. Y.
THE SELF-TRAINING INTERPRETIVE AND RETRIEVAL SYSTEM: IMPROVED SUBSTRUCTURE PERCEPTION Ph.D. Thesis
Kevin Shizuaki Haraki 1980 134 p
Avail: Univ. Microfilms Order No. 8020825

The self training interpretive and retrieval system (STIRS) is discussed with respect to its capability of elucidating the structural features of the unknown compound from its mass spectrum. The STIRS selects sixteen classes of mass spectral data which are indicative of particular types of structural features and searches a reference file for the fifteen best matching compounds in each class of mass spectral data. These retrieved compounds are examined for the presence of 177 frequently found substructures. For the average unknown, STIRS is capable of identifying eight structurally unique nodes (nonhydrogen atoms) correctly, one node related to the correct structure, and in half the cases, one node incorrectly. Dissert. Abstr.

N80-33510 Georgia Univ., Athens.
DIFFICULT GAS-CHROMATOGRAPHIC SEPARATIONS: ISOTOPIC FRACTIONATIONS AND EXTRACTS OF CARBONACEOUS MATERIALS Ph.D. Thesis
John Charles Fetzer 1980 93 p
Avail: Univ. Microfilms Order No. 8023136

A high precision gas chromatograph was used in conjunction with a quadrupole mass spectrometer and an on-line computer to study the fractionation of carbon and oxygen isotopes in carbon monoxide on silica and on finely divided nickel powder. Relative retentions were studied as a function of temperature using both natural abundances and isotopically enriched species. The use of supercritical pentane as an extracting solvent was examined. It was found that the carbon was actually broken down by the pentane. To see if this was general behavior for other types of carbon, several materials were examined (high purity graphite, technical grade graphites, active carbons, and charcoals). Dissert. Abstr.

N80-33511 George Washington Univ., Washington, D.C.
SPATIALLY RESOLVED STUDIES OF FLAME AND PLASMA AS SOURCES FOR ATOMIC SPECTROSCOPY Ph.D. Thesis
Manahen Fernadez 1979 225 p
Avail: Univ. Microfilms Order No. 8021264

Spatially resolved flame temperatures were spectroscopically measured using the slope method over small (approximately equal to 0.7 microliters) relatively homogeneous volumes of flame gases. The spatial resolution was uniquely obtained by introducing Co as a thermometric species into isolated volumes via the use of a droplet injection technique. By this method the emission of light was restricted to a limited volume whose position in the flame can be accurately determined and controlled. Vertical resolution was determined by the width of the entrance slit of the monochromator employed (100 micrometers in this study), and horizontal resolution was limited by the width of the emission cloud formed by the injected droplets (1 to 3 mm). The possibility of self absorption effects was greatly reduced because of the short absorption path length involved. The performance of the method was illustrated by its application to the spatial temperature mapping of the secondary reaction zone of a cylindrical air-acetylene flame. The effects of N2 as a sheathing gas and of flame stoichiometry on the radial and vertical temperature distribution of the flame were also investigated. It was determined that a large virtually isothermal central zone exists in the flame. Dissert. Abstr.

N80-33512 Virginia Univ., Charlottesville.
DEVELOPMENT OF A SCANNING ELECTRON MICROSCOPE BASED MICROANALYTICAL SYSTEM Ph.D. Thesis
James Allan Davis 1980 176 p
Avail: Univ. Microfilms Order No. 8021180

A scanning electron microscope (SEM) was converted into a multifaceted microanalytical instrument. This included the addition of an energy dispersive X-ray spectrometer and associated electronics. Hardware and software were developed to interface the system's multichannel analyzer to a microcomputer for mass data storage and manipulation. To take advantage of the increased sensitivity offered by direct X-ray excitation, various thin metal foils were placed in the path of the primary electron beam. This allowed the microscope to be used as a X-ray tube with a changeable anode material. After improvements to the SEM's vacuum system, secondary ion mass analysis capabilities were added. This included a large beam ion gun and a quadrupole mass filter. An electrostatic energy prefilter was found to be necessary to ensure adequate spectral resolution. A means was developed for repetitive scanning of a given mass range to enhance the signal to noise ratio. Dissert. Abstr.

N80-33513 Northeastern Univ., Boston, Mass.
STUDIES IN ATOMIC ABSORPTION SPECTROSCOPY UTILIZING ELECTROTHERMAL ATOMIZATION Ph.D. Thesis
Paul Robert Demko 1980 195 p
Avail: Univ. Microfilms Order No. 8023639

Various means for eliminating the gas phase interference effect were sought. The use of the hydrogen diffusion flame with the commercial furnace system resulted in some improvement; however the furnace-in-flame or combined atomizer technique was studied and found to be useful for the elimination of not only gas phase interferences, but also occlusion effects. Furnace in flame atomizers conform closely to the model for an ideal electrothermal atomization device. The application of the Woodriff furnace to the analysis of metals that form volatile hydrides was investigated. This technique coupled the sensitivity of furnace atomic absorption and the high sample capacity of hydride evolution methods. Nanogram detection limits were achieved for the analysis of As, Sb, and Sn. Dissert. Abstr.

N80-33514 Chicago Univ., Ill.
OXYGEN AND NITROGEN NUCLEAR MAGNETIC RESONANCE STUDIES OF AMIDES AND AROMATIC ALDEHYDES AND KETONES Ph.D. Thesis
Thomas Edgar St. Amour 1980 177 p
Avail: Univ. Microfilms Order No. 8023253

Oxygen 17 nuclear magnetic resonance is utilized in exploring substituent effects and hydrogen bonding interactions in aromatic carbonyl systems. Chemical shifts and relaxation rates are presented for a wide range of mono- and poly-substituted benzaldehydes and acetophenones. Intermolecular hydrogen bonding interactions can be followed by substantial changes in the oxygen 17 chemical shifts and relaxation rates. Oxygen 17 and nitrogen 14 relaxation rates are employed in studying motional dynamics in aromatic aldehyde and ketone systems. Chemical shifts as well as relaxation rates are employed in studying amide-amide and amide-solvent interactions. Solvent and concentration dependence studies demonstrate that oxygen 17 nuclear magnetic resonance is an effective tool in the study of more complicated biomolecules. The effects of hydrogen bonding on the screening at the nitrogen 14 nucleus are also detailed. Dissert. Abstr.

N80-33515 California Univ., Los Angeles.
EFFECTS OF ULTRA-HIGH PRESSURES ON METHANOL, ETHANOL, CALCIUM OXIDE, RUTILE, CASSITERITE, AND GERMANIUM DIOXIDE Ph.D. Thesis
Joseph Francis Mamone 1980 164 p
Avail: Univ. Microfilms Order No. 8023340

The effects of extremely high pressure on phase equilibria in calcium oxide, several dioxides isomorphous with cassiterite (TiO2, GeO2, SnO2), and two alcohols, methanol and ethanol, were studied by powder X-ray diffraction and infrared and Raman spectroscopy. Pressures were generated with a diamond anvil high pressure cell. Vibrational spectra of methanol and ethanol were measured to 100 k bar at room temperature. At high pressures, methanol either crystallizes or forms a glass (supercooled liquid), whereas ethanol always crystallizes. In ethanol, the frequency of the O-H stretching mode shows large negative shifts with increasing pressure due to the strengthening of hydrogen bonding. The Raman spectra and polymorphism of rutile were investigated under hydrostatic pressures up to 90 kbar at room temperature. The equation of state of CaO was studied under static pressures of 652 kbar and the temperature and hydrostatic pressure dependence of the Raman spectra of cassiterite type dioxides were investigated. Dissert. Abstr.

N80-33516 Colorado State Univ., Fort Collins.
IONIC INTERACTIONS IN THE LIQUID STATE BY MULTINUCLEAR MAGNETIC RESONANCE Ph.D. Thesis
Joel Lee Gray 1980 281 p
Avail: Univ. Microfilms Order No. 8022401

Electrolyte systems of sodium tetraethylaluminate (NaTEA)

in m-xylene tetrahydrofuran (THF), pyridine and binary mixtures of m-xylene and THF and of m-xylene and pyridine have been studied by sodium 23, aluminum 27 and proton nmr. In m-xylene aggregation was found to be the important influence on the sodium 23 chemical shift and linewidth. In mixtures of m-xylene and THF or m-xylene and pyridine variations in sodium 23, aluminum 27 and proton nmr parameters were recorded to investigate the nature of and gross structural features of ionic species in solution. The sodium 23 and aluminum 27 linewidths were found to be sensitive to the combination of ion-ion, solvent-cation, solvent-anion interactions, and aggregation. The patterns of nmr data of the single solvent systems of NaTEA in pyridine and NaTEA in THF bore little resemblance to the nmr data of binary solvent systems. Aluminum 27 nmr was used to study room temperature molten salt mixtures of 1-n-butylpyridium chloride and AlCl3. Two overlapping aluminum 27 resonances with vastly different linewidths were resolved by time resolution nmr experiments. Dissert. Abstr.

N80-33517 Cornell Univ., Ithaca, N. Y.
COMPUTER PREDICTION OF MOLECULAR WEIGHTS FROM UNKNOWN MASS SPECTRA Ph.D. Thesis
In Ki Mun 1980 128 p
Avail: Univ. Microfilms Order No. 8020854

The self training interpretive and retrieval system (STIRS) is a computer program for aiding mass spectral interpretation. The STIRS program provides quantitative information about the molecular weight. In each of several different mass spectral data classes, STIRS retrieves the 15 reference mass spectra which best match the unknown in mass spectral behavior. Also combination match classes, made up of combinations of these data classes, retrieve compounds whose mass spectra most closely match the overall spectral behavior of the unknown. A data class for the reference spectra without molecular ions are added to STIRS as well as a routine which calculates the number of bromine and chlorine atoms in the unknown based on isotopic abundances. These probabilities and the abundance values of corresponding peaks in the unknown spectrum are used to compute the relative confidence value of each candidate molecular weight. The bromine and chlorine atom content of the unknown from the halogen routine is used to reinforce the confidence values. Dissert. Abstr.

N80-33518 Clarkson Coll. of Technology, Potsdam, N.Y.
THE ACTIVATED CARBON THIN FILM ADSORBER Ph.D. Thesis
Robert Peter Kane 1980 162 p
Avail: Univ. Microfilms Order No. 8023220

A activated carbon adsorption system was developed which used powdered carbon enmeshed in a collodion film. The system was designed to be used for hemoperfusion treatment of poison patients. Hemoperfusion involved flowing the patient's blood over a bed of adsorbent materials, (activated carbon or resin) which removes the toxin from the blood stream. This activated carbon collodion film was rolled to form a coil, through which the blood would axially flow. Three of these coils were placed into a plexiglass housing to form what is referred to as the thin film adsorber. The results were compared with those of four commercially available hemoperfusion devices. The factors evaluated included the rate and capacity of drug removal, pressure drop, fluid flow characteristics, and compatibility with blood. Dissert. Abstr.

N80-33519 Texas A&M Univ., College Station.
THE DEVELOPMENT OF MIXTURE INJECTED SURFACE-IGNITION ENGINE Ph.D. Thesis
Vankayalapat Sudhakar 1980 65 p
Avail: Univ. Microfilms Order No. 8023073

The feasibility of igniting lean air-fuel mixture with a torch formed by injecting a stoichiometric mixture over a hot surface near the end of the compression stroke was explored and proved. Several variables affecting the performance of the mixture injected surface ignition engine were identified and their effects on the engine operation were examined. Lean misfire limits for engine speeds between 2000 RPM and 3000 RPM were found to vary between air-fuel ratios 19.7:1 and 216:1 for regular blend gasoline in a 4 cylinder configuration. Fuel consumption comparisons with a standard spark ignited engine of equal displacement and compression ratios showed improvements for the MISI engine. Specific exhaust emissions of CO, HC and NO sub x from both engines were compared. The MISI engine had generally the same levels of CO and HC and higher levels of NO sub x emissions than the spark ignited engine. Dissert. Abstr.

N80-33520# Virginia Polytechnic Inst. and State Univ., Blacksburg.
DEVELOPMENT AND APPLICATION OF ANALYTICAL TECHNIQUES TO CHEMISTRY OF DONOR SOLVENT LIQUEFACTION Quarterly Progress Report, Jan. - Mar. 1980
H. C. Dorn and L. T. Taylor Jun. 1980 20 p
(Contract DE-AC22-80PC-20041)
(DOE/PC-20041/T1) Avail: NTIS HC A02/MF A01

Elemental analyses (Mg, Al, P, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Sr, Zr, Mo, Cd, Ba, W, Hg) were measured on ashed samples of Amax feed coal and Amax solvent refined coal (SRC). Significant concentrations of most of the elements monitored were found. Since the SRC process is designed to remove mineral matter it is not surprising that the level of metal in SRC is lower than in the feed coal for many metals. Unexpectedly certain elements appear to be concentrated into the SRC product. Those metals where the concentration has diminished greatly (Ca, Al, Fe, and Mg) on going from raw coal to SRC are probably mineral related. There are numerous metals (Co, Zn, Cu, Ni, Cr, Mn, Cd) whose concentration is higher in SRC. These, we believe, are most likely organic related in SRC. This is not unreasonable since the group is 100% transition metals and it is these metals which are most likely to form organometallic species. Cobalt and zinc are especially noteworthy in this regard showing a threefold increase in concentration in SRC over the feedstock. DOE

N80-33521# University of Southern California, Los Angeles.
ASSIGNING REACTIVE EXCITED STATES IN INORGANIC PHOTOCHEMISTRY
Arthur W. Adamson Aug. 1980 29 p refs Submitted for publication
(Contract N00014-76-C-0548)
(AD-A088566; TR-12) Avail: NTIS HC A03/MF A01 CSCL 07/4

The matter of assigning reactive excited states in inorganic photochemistry turns out to have complexities as more detailed and more varied information is obtained. Three cases are considered. For Cr(3) amines there is still much controversy in the assignment of chemical reactivity to doublet and quartet states. In the case of Rh(NH3)5X(2+) complexes, it may be necessary to invoke three different reactive or emitting ligand field excited states, and in that of W(CO)5L species, at least two, including a charge transfer state, are needed. Author

N80-33522# Naval Research Lab., Washington, D. C. Surface Chemistry Branch.
TESTING IODIZED ACTIVATED CARBON FILTERS WITH NONRADIOACTIVE METHYL IODIDE Final Report
Victor R. Deitz and James B. Romans 30 May 1980 58 p refs
(AD-A088666; NRL-MR-4240) Avail: NTIS HC A04/MF A01 CSCL 18/2

Iodized carbons, impregnated with KIx(KI - xI2), were evaluated for trapping methyl iodide-127. In this method the complete effluent of the carbon is sampled and analyzed continuously. In contrast, the RDT-M16 test procedure counts the carbon and the back-up beds for the accumulated 131 species and no information is obtained for the interaction of the large amount of carrier methyl iodide-127 with the iodized charcoal. The test apparatus to measure the penetration of methyl iodide-127 is described and the calibration procedures are detailed. Results are given for the penetration of methyl iodide-127 through new activated carbons, carbons in service, and exhausted carbons withdrawn from service. The reduction in trapping efficiency with service is accompanied by the development of a maximum in the concentration of methyl iodide-127 during the air purge after the dose period. This behavior has escaped notice with methyl iodide-131 due to the way that test is made. The chromatographic holdup of methyl iodide-127 by carbons in service, together with the subsequent slow desorption step, could

result in a dilution of the penetration iodine to acceptable levels under some conditions encountered in plant filter operations.
GRA

N80-33523* Aerospace Corp., El Segundo, Calif.
LASER EXCITED NONRESONANT FLUORESCENCE SPECTROSCOPY Annual Progress Report
J. A. Gelbwachs and R. P. Frueholz 30 Jun. 1980 44 p refs
(Contract DE-AM03-76SF-01101)
(ATR-80(7783)-1; APR-2) Avail: NTIS HC A03/MF A01

The relative populations of numerous tin levels populated by collisional energy transfer from an initially laser pumped level were obtained. These populations yield information concerning the relative rates of energy transfer for the various buffer gases studied. The results indicated two distinct energy transfer behaviors. First, for certain tin levels diatomic collision partners produce populations nearly two orders of magnitude higher than when rare gases are present. Second, for other tin levels, diatomics and rare gases transfer population approximately at the same rates and more efficiently than in the former case. For these levels the near resonant pathways can be obscured by means of a more effective energy transfer channel common to both diatomics and rare gases such as by curve crossing mechanisms.
DOE

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N80-33524 British Library Lending Div., Boston Spa (England).
HARD-GOLD COATINGS DEPOSITED USING PULSATING CURRENT AND THEIR SUITABILITY FOR USE IN PLUG CONNECTIONS
M. Bramik and R. Schnabl May 1980 20 p refs Transl. into ENGLISH from Metalloberflache, (Munich), v. 33, no. 9, 1977 p 350-354
(BLL-RTS-12203) Avail: British Library Lending Div., Boston Spa, England

Gold layers which are deposited using pulsating current exhibit better ductility at high pulsating current densities than gold layers which were deposited by means of direct current. Hardness, depth of surface roughness, porosity, and resistance to corrosion for those layers deposited by the pulsating current process exhibit no significant improvement when compared with the layers deposited by means of direct current.
F.O.S.

N80-33525 British Library Lending Div., Boston Spa (England).
THE USE OF CURRENT-LESS (CHEMICAL) NICKEL-PLATING IN VACUUM-AND-PRECISION- ENGINEERING
Josef Heppekausen May 1980 12 p ref Transl. into ENGLISH from Galvanotechnik, Baden-Wuerttemberg, (Germany), v. 70, no. 5, 1979 p 401-403
(BLL-RTS-12025) Avail: British Library Lending Div., Boston Spa, England

The process of currentless nickel plating is illustrated. Refining costs are less, though chemicals cost is higher than in electrolyte processes.
S.F.

N80-33526 British Library Lending Div., Boston Spa (England).
ELECTRON MICROSCOPICAL INVESTIGATION ON THE AGE HARDENING OF SPRING ALLOYS BASED ON Co-Ni-Cr-Fe
I. Pfeiffer Jun. 1980 16 p refs Transl. into ENGLISH from Z. metallk., Stuttgart, v. 57, no. 8, 1966 p 635-641
(BLL-RTS-12152) Avail: British Library Lending Div., Boston Spa, England

The precipitation hardening of alloys based on chromium, iron, nickel, and cobalt was studied. The mechanical properties of these alloys were investigated through electron microscopy.
T.M.

N80-33527 British Library Lending Div., Boston Spa (England).
ELECTROPLATING: METAL DEPOSITS BY ELECTROLYSIS, THROWING POWER
Richter Feb. 1980 18 p Transl. into ENGLISH from Galvano (Paris), v. 28, no. 10, 1959 p 459-464
(BLL-RTS-11870) Avail: British Library Lending Div., Boston Spa, England

The throwing power of an electrolyte derives from the ability of lines of current to distribute themselves evenly or not on a cathode of geometric form characterized by points irregularly distant from the anode. In many objects there are less shielded places or recesses which present difficulty in deposition and the thickness of the plate is too small to provide sufficient anticorrosive protection. Although it is impossible to oppose certain strict laws which govern the complicated process of an electrolytic medium, the factors which directly influence the electrolytic deposit can be manipulated. These active factors are (1) formulation or chemical composition; (2) constituents of a bath and their concentration; (3) temperature; (4) agitation; (5) anode-cathodedistance; (6) current density; and (7) position of the cathode on the jig. Each of these elements is analyzed and their influence and manipulation are considered. Typical formulations possessing good throwing power are described. These include a cadmium plating bath, a classic nickel bath, and an alkaline copper plating bath.
A.R.H.

N80-33528 British Library Lending Div., Boston Spa (England).
IN SITU DOPING OF THIN Ca (x)Hg (1-x)Te FILMS OBTAINED BY CATHODE SPUTTERING IN MERCURY VAPOUR. APPLICATION TO THE PRODUCTION OF INFRARED DETECTORS
A. Zozime, H. Drappier, C. Sella, M. Chauveau, and G. Cohen-Solal Feb. 1980 11 p refs Transl. into ENGLISH from Vide, (France), (175) 1975 p 19-22
(BLL-RTS-11980) Avail: British Library Lending Div., Boston Spa, England

A nonequilibrium doping technique in the field of thin films is described. The semiconductor material is prepared in the form of a thin layer by cathode sputtering, and the impurity chosen for doping is introduced by cosputtering.
L.F.M.

N80-33529 British Library Lending Div., Boston Spa (England).
BRIGHT DIPPING SOLUTION FOR IRON-NICKEL-COBALT ALLOYS
H. Mizoi Apr. 1980 15 p ref Transl. into ENGLISH from Shin Nippon Denki Gihu (Japan), v. 12, no. 18, 1978 p 111-115
(BLL-RTS-12198) Avail: British Library Lending Div., Boston Spa, England

An acid mixture with acetic acid as the main constituent is commonly used as the bright dip solution for Kovar, but acetic acid has disadvantages in that being an organic acid, BOD is high, and waste liquid treatment is difficult. Development of a solution with an inorganic acid (sulphuric acid, nitric acid, etc.) as the main constituent has been found, and if surface activation agents are added, finishes of the same degree as given by the acetic acid systems can be obtained.
L.F.M.

N80-33530 British Library Lending Div., Boston Spa (England).
THE USE OF GLUCONATES FOR ELECTROLYTIC AND CURRENT-LESS METAL DEPOSITING
Anna Kouba Jun. 1980 22 p Transl. into ENGLISH from Surfaces (France), v. 17, no. 116, 1978 p 25-29
(BLL-RTS-11997) Avail: British Library Lending Div., Boston Spa, England

In recent years a number of bath compositions were developed which contain such different chelating agents as the fluoborates, the purophosphates, and the sulphamates. One class of chelating agents may be produced from the anions of organic acids obtained from agricultural raw materials such as: citric acid, produced by the fermentation of sweetened juices; tartaric acid, which is a by-product of the manufacture of wine; and gluconic acid, produced from maize. These organic substances have the following advantages by comparison with other natural mineral substances: their nontoxicity, since they are used within the food industry; their source, since it is renewable annually; and their biodegradability, which could result in the simplification of the treatment of the effluent before it is discharged.
E.D.K.

N80-33531 British Library Lending Div., Boston Spa (England).
CORRELATION BETWEEN SEGREGATION AND COLD CRACKING

H. Cerjak, J. Schmidt, and R. Loehnberg 5 Mar. 1980 12 p refs Transl. into ENGLISH from 4th MPA Seminar, Germany Presented at the 4th MPA Seminar on Safety of Pressurised Light Water Reactor Containments, Germany, 5 Oct. 1978
(BLL-Trans-4253-(9091.9F)) Avail: British Library Lending Div., Boston Spa, England

A correlation between segregation in ferritic base metal and the occurrence of cold cracking is found. Besides describing the mechanical and engineering properties and chemical composition of the segregated areas, their behavior when welded over is discussed. Characteristics and models of crack development are presented using cold cracking found in various components as an example. Measures for limiting the risk of the occurrence of cold cracking are increasing the preheating temperature, use of weld filler material with optimum dryness, and heat treatment directly following welding. Author

N80-33532 British Library Lending Div., Boston Spa (England).
CHEMICAL NICKEL-PLATING WITH SODIUM BOROHYDRIDE. PROCESS TECHNOLOGY AND PROPERTIES OF COATS
E. Lanzoni Aug. 1980 24 p refs Transl. into ENGLISH from Metalloberflache (West Germany), v. 33, no. 7, 1979 p 261-268
(BLL-RTS-12156) Avail: British Library Lending Div., Boston Spa, England

By chemical reduction with sodium borohydride it is possible to deposit a layer of nickel boron alloy (4% to 5%) on many metallic and nonmetallic surfaces which show, particularly after heat treatment, unusual hardness and wear resistance properties. The reduction reaction, which is always accompanied by the evolution of hydrogen, can be made more or less strong by altering the temperature of the bath solution and the concentration of the reaction medium, particularly the sodium borohydride and the thallium nitrate. By using fresh bath solutions, precipitates of 330 micron m to 400 micron m can be obtained under working conditions at 90 C to 95 C, without topping the bath solution. The process yield is high only in the first two or three hours, at a speed which can reach 100 micron m/hour. If correspondingly stabilized, the bath solutions react with little sensitivity to the presence of suspended materials such as dust and impurities, and do not show any decomposition in this time. A.R.H.

N80-33533 British Library Lending Div., Boston Spa (England).
THE REFLOWING OF TIN-LEAD DEPOSITS
H. A. Gerstberger and G. Strube Aug. 1980 15 p Transl. into ENGLISH from Galvanotechnik (West Germany), v. 70, no. 10S, 1979 p 961-965
(BLL-RTS-12262) Avail: British Library Lending Div., Boston Spa, England

Tin coatings have a tendency to produce very thin capillary crystals, known as 'whiskers', from their upper surface as a result of slow transformation processes. Whiskers can give rise to the risk of short circuits occurring between adjacent conductors. A further disadvantage of tin coatings is the possibility of the occurrence of the so called tin disease. Where the tin is used continuously at temperatures which are very much lower than 0 C, the danger is present that the beta tin which exists under normal operating temperatures will be transformed into alpha tin. This transformation of beta tin into alpha tin is accompanied by a considerable increase in volume, which brings about the degeneration of the compact metal into powder. Tin lead coatings are used to prevent the occurrence of whiskers and tin disease. Matt tin lead coatings are deposited, since they permit trouble free reflowing. S.F.

N80-33534 British Library Lending Div., Boston Spa (England).
THE DEPOSITION OF PALLADIUM COATINGS WITH LOW HYDROGEN CONTENT AND STRESS IN SULPHURIC ACID ELECTROLYTE
H. D. Hedrich and C. J. Raub Aug. 1980 19 p refs Transl. into ENGLISH from Galvanotechnik (West Germany), v. 70, no. 10S, 1979 p 934-939
(BLL-RTS-12267) Avail: British Library Lending Div., Boston Spa, England

Potentiometric and spectrum potentiometric analyses were used to demonstrate the complex building of palladium through sulfite ions in a sulfuric acid solution. The sulfite is reduced to sulfide which is absorbed on the cathode. The palladium sulfide has an inhibiting effect on the deposition of palladium and is incorporated on crystallization. The sulfur content of the palladium rises with the sulfite content of the electrolyte and the cathode current. The properties of the palladium coatings are largely determined by the sulfur incorporated in them. The palladium contents are finely crystalline and hard, and have a marked '100' fiber structure. The sulfuric acid electrolyte with the addition of sulfite is not sensitive to metallic contaminations nor to the introduction of cyanide, but where the substrate is a base metal, it requires the use of a noble metal layer (strip plating) with gold or palladium in a complex electrolyte. A.R.H.

N80-33535 British Library Lending Div., Boston Spa (England).
THE DIFFUSION OF COPPER INTO GOLD COATINGS AT ELEVATED TEMPERATURES
J. Pitter, L. Vrobel, V. Masarik, and M. Srb Aug. 1980 15 p refs Transl. into ENGLISH from Metalloberflache (Munich), v. 33, no. 10, 1979 p 415-419
(BLL-RTS-12292) Avail: British Library Lending Div., Boston Spa, England

Copper diffusion at the grain boundaries of gold coating is the reason for the electrochemical nucleation of less noble precipitate at the surface and inside the coating. This has an unfavorable influence on the corrosion resistance of the coating and on the value of the ohmic resistance of the gilded contact. Together with the recrystallisation of the gold matrix, the precipitate influences the mechanical properties of the coating. The zinc and nickel diffusion in the coating is essentially slower than the copper diffusion. Diffusion at the grain boundaries and the defects remaining in the crystal lattice are still the prevailing mechanisms after annealing at 500 C and 600 C. Rapid and essential changes in the crystal structure of the gold occur at temperatures above 500 C. It is possible, to use heating to 400 to 500 C as accelerated testing of the resistance to depreciation of the coating during the diffusion process. S.F.

N80-33536 British Library Lending Div., Boston Spa (England).
RESISTANCE TO CORROSION OF CHROMATED ZINC COATINGS
K. Beyer Sep. 1980 10 p Transl. into ENGLISH from Galvanotechnik (West Germany), no. 12, 1979 p 1193-1196
(BLL-RTS-12304) Avail: British Library Lending Div., Boston Spa, England

The requirements for the corrosion resistance of chromated zinc coatings are presented. Requirements for the thickness of the metal layer are also presented. T.M.

N80-33537 British Library Lending Div., Boston Spa (England).
NOBLE METAL ELECTROPLATED COATINGS ON PRINTED CIRCUIT CONNECTORS
B. Endres and H. Golembka Sep. 1980 20 p refs Transl. into ENGLISH from Galvanotechnik (West Germany), v. 70, no. 10, 1979 p 952-957
(BLL-RTS-12265) Avail: British Library Lending Div., Boston Spa, England

The high corrosion resistance and good electrical properties of gold coatings are of prime importance in connector elements for information technology, particularly in circuit boards where the coating not only protects the substrate from corrosion (as a resist in etching) but also allows energy transfer with as little loss as possible. Other factors such as hardness, wear resistance, porosity, and ease of soldering also play an essential role. The electrolytes used in circuit board technology for the deposition of gold and gold alloys are categorized and analyzed. These include acid gold baths, neutral gold baths, and alkaline baths, with and without cyanide. The advantages of pulse plating in reducing porosity and achieving the required minimum thickness are discussed as well as selective coating with noble metals, low carat gold layers, and palladium deposition. A.R.H.

N80-33538 British Library Lending Div., Boston Spa (England).
INVESTIGATIONS INTO THE DISTRIBUTION OF THE LAYER THICKNESS PRODUCED BY BARREL ELECTROPLATING IN THE CASE OF CYANIC SILVER PLATING
H. D. Hedrich and Ch. J. Raub Jun. 1980 29 p refs Transl. into ENGLISH from Metalloberflache (West Germany), v. 33,

no. 9, 1979 p 355-360
(BLL-RTS-12204) Avail: British Library Lending Div., Boston Spa, England

The influence of various physical deposition parameters on the distribution of layer thickness was investigated in the case of the barrel electroplating of steel spheres in a drum. By means of model experiments, statistically reliable indications were obtained for the effect of the level of fill of the electroplating equipment, the rate of rotation of the drum, and the period of plating or the cathodic density of the deposition current, in the case of cyanic silver plating. Results show that there is an increase in the current efficiency of the metal depositing as the level of fill of the drum is increased, accompanied by a simultaneous increase in the scatter of the layer thickness throughout the batch on the individual components. The optimum plating conditions are achieved at levels of fill between 35 and 50%. In the case of spherical objects the coefficient of variation of the thickness of the silver coating reduces proportionally to the cube of the speed of rotation of the drum. Shortening of the duration of deposition is accompanied by the deterioration of the distribution of layer thickness. A.R.H.

N80-33539 British Library Lending Div., Boston Spa (England).
EFFECTS OF FLANK PROTECTION MEDIA IN THE ETCHING OF COPPER
T. Muramaki and C. J. Raub Sep. 1980 18 p Transl. into ENGLISH from Galvanotechnik (West Germany), v. 71, no. 3, 1980 p 231-237
(BLL-RTS-12359) Avail: British Library Lending Div., Boston Spa, England

A higher etch factor can be obtained for the sides of deeply pitted and contoured parts by the addition of substances which form a soluble complex on the surface of the metal with copper ions dissolved in the etching solution. This covering layer retards further solution. The resting potential of a copper electrode in electrolytes with different additives was determined. Current changes for anodic polarization and changes of the diffusion layer in the etching solution were studied. Results show that it is possible to select suitable flank protectors from the wide range of available organic compounds by using resting potential measurement. Good flank protectors always give negative potentials with increasing concentration of additive. A resting potential altered by additives generally becomes positive again under ultrasound treatment, but only alters slightly with good flank protectors such as thiourea. The influence of the viscosity on the diffusion layer thickness is relatively strong, especially in the region of low viscosities. Differences in the type of etch structure of the metal surface have a marked effect on the formation and structure of the covering layer on the copper. A.R.H.

N80-33540 British Library Lending Div., Boston Spa (England).
CHROMATING
W. D. Schulz and Ing. W. Kassner Sep. 1980 17 p refs Transl. into ENGLISH from Galvanotechnik (West Germany), v. 71, no. 2, 1980 p 126-130
(BLL-RTS-12344) Avail: British Library Lending Div., Boston Spa, England

The corrosion protection effect of chromate coatings on zinc was examined. The connection between the molecular structure and the electrochemical behavior of the protective coating was also examined. T.M.

N80-33541 British Library Lending Div., Boston Spa (England).
THE INTERACTION BETWEEN PIPE-COATINGS AND CATHODIC CORROSION-PROTECTION
W. Schwenk [1980] 16 p Transl. into ENGLISH from Res. Inst. of Mannesmann AG Report, Duisburg, West Germany
(BLL-Trans-T4943/BG/ERS/79) Avail: British Library Lending Div., Boston Spa, England

Interactions between corrosion protective coatings and cathodic protection which lead to blistering and disbonding when the media contain alkali ions are considered. An impairment of the protective effect is, only possible with thin coatings such as are usual with ships and with steel hydraulic structures. Thick layered coatings for pipelines are subject to disbonding without detriment to the corrosion protective effect. It is shown that tests with regard to disbonding are of doubtful value as evidence. Tests of thin coatings overlook possible blistering because of the time required for this to develop. Author

N80-33542 British Library Lending Div., Boston Spa (England).
CATHODIC CORROSION-PROTECTION IN AREAS SUBJECT TO EXPLOSION HAZARDS
28 Jun. 1980 5 p refs Transl. into ENGLISH from Deutschen Verein von Gas und Wasserfachmannern, Afk Recommendation no. 5, Nov. 1973
(BLL-T4934/BG/ERS/79(9022.048)) Avail: British Library Lending Div., Boston Spa, England

For the installation and operation of cathodic protection systems, in areas subject to explosion hazards, special precautions that must be taken in order to prevent the risk of ignition are discussed. Such a risk may arise owing to sparking caused by electrical equipment or by lightning discharge. Participating agencies which provide personnel concerned with the installation or operation of cathodic protection systems with guidance concerning the construction, operation, and inspection of such systems are listed. Other protective measures are also employed for the transloading of dangerous liquids in the vicinity of harbours and waterways. R.K.G.

N80-33543 British Library Lending Div., Boston Spa (England).
METAL SURFACE DAMAGE DUE TO CAVITATION EROSION
Y. Mizutani, Yoshiyuki Mizutani, Tomoji Ishiguro, and Koichi Nakajima Feb. 1980 12 p refs Transl. into ENGLISH from Nihon Kinzoku Gakkaishi (Japan), (4), 1971 p 319-323
(BLL-RTS-12269) Avail: British Library Lending Div., Boston Spa, England

Using X-ray diffraction and electron microscopy, the observations were made upon examining the damage in a metal surface during cavitation. These include: (1) change in internal structure apparent in incubation period and dependent on heat treatment of material; (2) cavitation gives rise to selective damage; (3) work hardening due to cavitation is accompanied by external surface damage and reaches saturation when entire surface is affected. S.F.

N80-33544 British Library Lending Div., Boston Spa (England).
CONTROL OF SOLIDIFICATION STRUCTURES AND PROPERTIES OF INDUSTRIAL Al-Si ALLOYS
S. Bercovici May 1980 36 p refs Transl. into ENGLISH from Hommes et Fonderie (France), v. 93, 1979 p 17-24
(BLL-RTS-11916) Avail: British Library Lending Div., Boston Spa, England

Methods for the control of solidification of eutectic alloys are presented. Major focus was on aluminum and silicon alloys. The mechanical properties of these alloys are described and their application in foundries is discussed. T.M.

N80-33545 Louisiana State Univ. and A&M Coll., Baton Rouge.
ION FLOTATION STUDIES AND SEPARATION PROCEDURES FOR THE PLATINUM GROUP METALS Ph.D. Thesis
Daniel Murphy Downey 1980 163 p
Avail: Univ. Microfilms Order No. 8021738

The ion flotation properties of the platinum group metals were studied, methods for the quantitative recovery of the platinum metals from dilute solutions by ion flotation were developed, and the feasibility of ion flotation for the group separation was investigated. The anionic chlorocomplexes of Pd(2), Ir(4), Pt(4), Au(3), Rh(3) and Ir(3) were floated from aqueous solutions with cationic surfactants of the quaternary ammonium type, RN R(prime)3 Br. The flotation behavior of each metal was determined with respect to variations of the surfactant primary, R, and secondary R(prime), chain lengths, the initial HCl concentration, the initial NaCl concentration, the initial surfactant concentration and the initial metal chlorocomplex concentration. Most of the surfactants prepared for this work floated the platinum metals. Procedures were developed for the single stage, batch ion flotation separation of several binary mixtures of the platinum metals. Conditions were adjusted in which one metal was selectively floated from the solution and recovered by a modified solvent sublation method in n-outyl accetate. Dissert. Abstr.

N80-33548 North Carolina Univ. at Chapel Hill.
CHARACTERIZATION OF SURFACE COMPLEXES ON LITHIUM Ph.D. Thesis
John Albert Schultz 1980 109 p
Avail: Univ. Microfilms Order No. 8022506

A technique for preparing clean evaporated lithium surfaces is presented. The surface complexes formed when the evaporated lithium surfaces are exposed to oxygen, water, or normal alcohols were characterized by ultraviolet photoelectron spectroscopy. Possible surface geometries for water and methanol adsorbates were predicted using the Gaussian 70 ab initio quantum mechanical procedure. Cluster models of the surface complexes containing adsorbate and up to ten atoms of lithium were constructed based on the (100) plane of lithium metal. By calculating the total energy of the surface complex as a function of adsorbate geometry, predictions of preferred binding sites and adsorbate geometry on those sites could be made.
Dissert. Abstr.

N80-33547 Virginia Univ., Charlottesville.
HVEM STUDIES OF HELIUM EMBRITTLEMENT IN STAINLESS STEEL Ph.D. Thesis
Joseph Arno Horton, Jr. 1980 282 p
Avail: Univ. Microfilms Order No. 8022669

Helium embrittlement was studied by in situ tensile testing of three types of samples between 25 C and 600 C in a high voltage electron microscope with an attached accelerator. The three types of stainless steel samples used were: (1) previously fast neutron irradiated; (2) 80 keV helium ion-irradiated during the tensile test inside the microscope; and (3) unirradiated control samples. Post failure analysis was then performed in a scanning electron microscope in order to relate the transmission electron microscope observations to the overall type of fracture which was occurring.
Dissert. Abstr.

N80-33548 Rutgers - The State Univ., Piscataway, N. J.
STUDY OF STRAIN DISTRIBUTION IN HELIUM IMPLANTED VANADIUM THREE SILICON BY THE DIVERGENT X-RAY BEAM METHOD Ph.D. Thesis
Ronald Joseph Schutz 1980 148 p
Avail: Univ. Microfilms Order No. 8022589

In an effort to analyze in detail the lattice expansion in strained V3Si, single crystal samples were prepared by bombarding them with 1.9 MeV He ions. The resulting expansion in the damaged surface layer was studied using the divergent beam X-ray technique. The aniostropic strain in the surface layer was determined as a function of He ion dose and the manner in which strain relaxation occurred was observed with a series of high vacuum anneals. The results of the analysis of V3Si showed that the largest principal strain was normal to the surface of the sample and the two lateral principal strains were approximately zero. The rotation matrix was found to be approximately zero which indicated that no net rotation of the layer occurred. The normal principal strain grew with increasing dose until it saturated at about a dose of 3.0 x 10 to the 17th power He/sq cm. Pseudo-Kossel patterns that originated in the strained layer displayed an asymmetric line broadening which grew with increasing dose. Analysis showed that the line broadening at low doses could be qualitatively explained by a strain which was linearly related to the nuclear stopping of the He ions.
Dissert. Abstr.

N80-33549 Case Western Reserve Univ., Cleveland, Ohio.
SURFACE OXIDE SOFTENING IN TUNGSTEN Ph.D. Thesis
Jorge Eduardo Talia 1980 173 p
Avail: Univ. Microfilms Order No. 8021721

The deformation behavior of surface oxide softened tungsten single crystals was examined as a function of etching time and temperature in the range T is approximately less than T sub m where T sub m is the absolute melting temperature. The combination of etching and oxide coating enhances the softening effect and increases the ductility observed at low temperatures. The stress-strain curves of etched and oxide coated crystals exhibit a pronounced three stage like deformation behavior over the temperature range 153 K to 300 K. A mechanism that involves the generation and motion of groups of mobile nonscrew dislocations at the stepped oxide-metal interface is proposed to explain these observations.
Dissert. Abstr.

N80-33550 Case Western Reserve Univ., Cleveland, Ohio.
THE BEHAVIOR OF INMOLD DEOXIDATION IN STEEL CASTINGS Ph.D. Thesis
Thomas Henry Bieniosek 1980 192 p
Avail: Univ. Microfilms Order No. 8021681

The technique for inmold deoxidation and its effect on steel casting properties was studied. Inmold deoxidation is based on the inmold process for ductile iron manufacture, in which magnesium-bearing alloys are introduced into the metal stream within the mold by means of a reaction chamber. For inmold deoxidation of steel castings, the deoxidizer is placed in a deoxidizer chamber designed to allow the solution of the deoxidizer into the passing metal stream at a steady rate. The results of the trials showed that the angled chamber design produced a uniform distribution of deoxidizer in the casting. These results indicated that a degree of turbulence must be introduced to the metal stream to allow the solution of an unreactive deoxidizer such as aluminum into the metal stream. The angled chamber design achieved this effect; the straight sided standard inmold design was suitable only for reactive deoxidizers such as those containing magnesium. The mesh size of the deoxidizer did not influence the rate of solution. No dependence on casting temperature was observed for the distribution of deoxidizers. The advantages of inmold deoxidation are compared to conventional ladle deoxidation.
Dissert. Abstr.

N80-33551 Case Western Reserve Univ., Cleveland, Ohio.
THE YIELDING BEHAVIOR OF UNIDIRECTIONAL METAL-MATRIX COMPOSITES Ph.D. Thesis
John Gayda, Jr. 1980 216 p
Avail: Univ. Microfilms Order No. 8021689

The primary yielding behavior of unidirectional metal matrix composites (aluminum alloy reinforced with high strength stainless steel wire) was shown to be dependent on the residual stress state of the matrix when the composite is subjected to uniaxial loads applied parallel or perpendicular to the fiber direction. More specifically, the yield point was found to be elevated if the sign of the deviatoric component of the residual stress state, associated with the matrix, in a direction parallel to the test axis, opposes that of the applied load. Further, the onset of yielding was accelerated if the sign of the matrix deviator and applied load were the same. These conclusions were based on a number of experiments which included tensile and compressive prestraining, refrigeration, and completely reversed strain cycling of composite specimens. In addition, analytical techniques were used to estimate the residual stress distributions and predict composite behavior.
Dissert. Abstr.

N80-33552 Notre Dame Univ., Ind.
HYDROGEN TRANSPORT IN NICKEL BASE SUPERALLOYS Ph.D. Thesis
David Anthony Mezzanotte, Jr. 1980 162 p
Avail: Univ. Microfilms Order No. 8021370

Hydrogen transport kinetics were measured for two nickel base superalloys by means of the electrolytic permeability technique. A model for H motion in each alloy was developed to account for the observed differences in H transport. For one of the alloys, Hastelloy Alloy C-276, the diffusivity decreased by a factor of two following aging. A model to predict the diffusivity of the aged alloy as a function of the volume fraction of the odered phase was developed. An atomistic model for diffusion in the odered alloy that qualitatively accounts for the decrease in diffusivity is described. Analysis of H transport in another nickel base alloy, Hastelloy Alloy G, indicated the presence of reversible and irreversible H traps. Reversible trapping by niobium solute atoms was postulated on the basis of an electronic and chemical attraction between H and niobium. Trap capture and release rates as well as trap binding energies were calculated. Irreversible trapping in the alloy was attributed to second phase carbide particles. The possibility of H being trapped as H2 gas was discussed.
Dissert. Abstr.

N80-33553 Ohio State Univ., Columbus.
THE PASSIVITY OF NICKEL-EFFECTS OF APPLIED POTENTIAL, SOLUTION pH AND ENVIRONMENTAL

TEMPERATURE Ph.D. Thesis
Chung-Yao Chao 1980 136 p
Avail: Univ. Microfilms Order No. 8022245

The passivity of nickel was studied by ellipsometric technique. Three important parameters that affect the passivity of metals, potential, solution pH, and temperature, were systematically investigated. Within the passive range, applied potential affects the thickness of the passive film but not the growth behavior of the film. In basic solutions (pH 9.1 and 12.6), the passive film can be formed instantaneously and then remains unchanged for a couple of hours. In moderate acid solution (pH 4.5), the passive film grows with time. In strong acid solution (pH 1.5), a two layer passive film is observed which evolves with time, too. When a pre-passivated nickel specimen is immersed in a solution for prolonged time, a multilayer film is found to grow on top of the passive film that originally exists on the surface of the metal. In aerated solution, a Ni(OH)2 film is formed. This film then undergoes a partially hydration process at later stage.
Dissert. Abstr.

N80-33554 Ohio State Univ., Columbus.
FRACTURE AND FLOW OF IRON AND ITS ALLOYS: THEORY AND EXPERIMENT Ph.D. Thesis
Ing-Hour Lin 1980 116 p
Avail: Univ. Microfilms Order No. 8022306

A three dimensional brittle crack advancing by double jog nucleation in the lattice trapping region, plastic instability in uniaxial tension tests, and stable crack growth in a ductile HSLA steel were investigated. A tensile brittle crack is simulated by a climb pileup of edge dislocations. The activation energies of nucleation for jogs were worked out for cracks. A method for determining the equilibrium configuration of dislocations in the discrete pileup is given. The equilibrium configuration of jog bands and their role in lowering the nucleation energy of the first double jog in the crack tip are also developed and determined numerically for iron, tungsten, diamond, silicon, and magnesium oxide. Plastic instability is treated for a material which satisfies Hart's criterion for the existence of a plastic equation of state. Stable crack growth measurements were performed on a Cu containing HSLA steel. Since the aging kinetics of Cu precipitates and carbides in the steel are independent of one another, large variations in strength and toughness can be achieved by means of an appropriate choice of heat treatment. The slow shear crack growth is tested using modified compact tension specimens.
Dissert. Abstr.

N80-33555*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LONG-TIME CREEP BEHAVIOR OF THE NIOBIUM ALLOY C-103
Robert H. Titran and William D. Klopp Oct. 1980 12 p refs
(NASA-TP-1727; E-224) Avail: NTIS HC A02/MF A01 CSCL 11F

The creep behavior of C-103 was studied as a function of stress, temperature, and grain size for test times to 19000 hr. Over the temperature range 827 to 1204 C and the stress range 6.89 to 138 MPa, only tertiary (accelerating) creep was observed. The creep strain epsilon can be related to time t by an exponential relation epsilon - epsilon(0) + K e raised to power (st) - 1), where epsilon (0) is initial creep strain, K is the tertiary creep strain parameter, and s is the tertiary creep rate parameter. The observed stress exponent 2.87 is similar to the three power law generally observed for secondary (linear) creep of Class I solid solutions. The apparent activation energy 374 kj/g mol is close to that observed for self diffusion of pure niobium. The initial tertiary creep rate was slightly faster for fine grained than for coarse-grained material. The strain parameter K can be expressed as a combination of power functions of stress and grain size and an exponential function of temperature. Strain time curves generated by using calculated values for K and s showed reasonable agreement with observed curves to strains of at least 4 percent. The time to 1 percent strain was related to stress, temperature, and grain size in a similar manner as the initial tertiary creep rate.
R.K.G.

N80-33556*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IMPROVED BOND COATINGS FOR USE WITH THERMAL BARRIER COATINGS Final Report
Michael A. Gedwill Sep. 1980 45 p refs
(Contract EF-77-A-01-2593)
(NASA-TM-81567; DOE/NASA/2593-1B; E-532) Avail: NTIS HC A03/MF A01 CSCL 11F

The potential for improving the durability of thermal barrier coatings (TBC's) being developed for coal derived fuel fired gas turbines was studied. Furnace oxidation behavior of plasma deposited bond coatings was improved by increasing the thickness from 0.010 cm to 0.015 cm and by depositing the coatings at 20 kW with argon 3.5 vol % hydrogen arc gas rather than at 11 kW with argon. The most oxidation resistant plasma deposited bond coatings were Ni-14.1Cr-13.4Al-0.10Zr, Ni-14.3Cr-14.4Al-0.16Y, and Ni-15.8Cr-12.8Al-0.36Y on B-1900 + Hf and Ni-30.9Cr-11.1Al-0.48Y on MAR-M-509. The oxidation resistant bond coatings improved TBC life when the coatings were deposited on the specimens supported on a rail bed fixture during coating.
Author

N80-33557*# Pennsylvania State Univ., University Park.
DIRECTIONAL SOLIDIFICATION OF NONOXIDE EUTECTICS Final Report, 1 Dec. 1976 - 31 May 1980
V. S. Stubican Jul. 1980 7 p refs
(Grants DAAG29-77-G-0057; DAAG29-79-G0020)
(AD-A088565) Avail: NTIS HC A02/MF A01 CSCL 20/11

The directional solidification of the eutectic composition in the systems SiC-TiB2, TiC-TiB2, ZrC-ZrB2 and ZrC-TiB2 was studied. Microstructures, crystallography, hardness, fracture toughness and wear were determined. In several of studied systems, mechanical properties exceeded that of the end members. The SiC-B4C lattice formed lamellar microstructures with no colonies if the solidification rate was below 2 cm/hr. Ingots of SiC-B4C, solidified at approximately 9 cm/hr, had considerably better wear resistance than solidified B4C or hot pressed SiC. The microstructure of ZrC-ZrB2 consists of columnar grains of parallel lamellae whose interlamellar spacings range from 2.75 micron m to 1.62 micron m, corresponding to a growth rate of 0.425.4 cm/hr. ZrC-TiB2 has a microstructure of a Chinese script type of broken and deformed lamellae morphology. Solid solution between the two phases exists. The TiC-TiB2 eutectic has low Miller indices. The interfacial phase contains only one kind of atom.
GRA

N80-33558# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Metals and Ceramics Div.
PILOT PLANT FORGING OF HYDROGENATED Ti-6Al-4V Final Report, 16 Feb. 1978 - 30 Jun. 1979
W. R. Kerr, F. J. Gurney (Westinghouse Electric Corp., Pittsburgh), and I. A. Martorell (Westinghouse Electric Corp., Pittsburgh) Jun. 1980 71 p refs
(AF Proj. 2418)
(AD-A089107; AFWAL-TR-80-4026) Avail: NTIS HC A04/MF A01 CSCL 11/6

This pilot plant forging program was performed on ingot stock which was machined into ring shaped workpieces. The rings were hydrogenated to obtain hydrogen contents between 0.1 weight percent and 1.2 weight percent. A micro-balance technique was used to determine the hydrogen content. A description of the equipment and procedures for hydrogenation of the material and verification of the hydrogen analysis is given. The ring forgings were performed on a hydraulic forge press using isothermal techniques. A temperature range between 922 K (1200 F) and 1144 K (1600 F) and deformation rates of 0.000126 m/s (0.3 ipm) and 0.0126 m/s (30.0 ipm) were used in the forging evaluation. Two heats of material were used. Three to six rings were forged at different reductions at each condition of temperature, rate and hydrogen content. Non-hydrogenated rings were also forged at each condition to form a baseline for comparison. Standard techniques were used to analyze the ring forging data. Results show that a 30% reduction in forging load results when material with approximately 0.4 weight percent hydrogen is used. At larger hydrogen contents, the deformation loads increase and are approximately equal to those for non-hydrogenated material when the hydrogen content is 0.8 weight percent. Deformation loads for the material with 0.4 weight percent hydrogen which are equivalent to those for non-hydrogenated produce occur at processing temperatures between 56 K (100 F) and 83 K (150 F) lower.
GRA

N80-33558# Cornell Univ., Ithaca, N. Y. Dept. of Chemistry.
DIGITAL IMAGE PROCESSING IN ION MICROSCOPE ANALYSIS: METHODS OF IMAGE QUANTIFICATION Interim Technical Report
D. M. Drummer and G. H. Morrison 20 Aug. 1980 35 p refs Submitted for publication
(Contract N00014-80-C-0538; NR Proj. 051-736)
(AD-A088792; TR-2) Avail: NTIS HC A03/MF A01 CSCL 09/2

Two methods of secondary ion image quantification are applied to the analysis of a low-alloy steel, evaluated, and compared. The use of ion implantation for providing an internal standard element and for fabricating 'imaging standards' for evaluation of quantification procedure accuracy is investigated and discussed. A basic philosophy is presented for multi-element, multi-feature analysis using ion images, and the use of effective display with the purpose of conveying meaningful compositional morphological information is investigated. GRA

N80-33560# General Electric Co., Schenectady, N. Y. Corporate Research and Development Center.
ORIGIN OF MAGNETIC PROPERTIES IN AMORPHOUS METALS Summary Technical Report, 1 Oct. 1978 - 1 Dec. 1979
F. E. Luborsky and J. J. Becker Dec. 1979 60 p refs
(Contract N00014-76-C-0807)
(AD-A089145; SRD-80-006) Avail: NTIS HC A04/MF A01 CSCL 11/6

The magnetic properties of amorphous metals are examined relative to changes in composition and heat treatment of amorphous transition metal-metalloid alloys. The transition metals examined were iron and iron plus nickel. These were alloyed with the metalloids, boron, silicon and carbon. Significant effects of alloy variation were observed on magnetic properties and on the crystallization and stress relief of these materials. The effects of stress on magnetic properties was studied. GRA

N80-33561# Metcut Research Associates, Inc., Cincinnati, Ohio.
EFFECT OF MULTIPLE SHOT PEENING/CADMIUM PLATING ON HIGH STRENGTH STEEL Final Report, 15 Sep. 1978 - 15 Dec. 1979
John B. Kohls and William J. Stross Apr. 1980 60 p
(Contract F33615-78-C-5201; AF Proj. 2418)
(AD-A088667; AFWAL-TR-80-4005; Rept-970-27070) Avail: NTIS HC A04/MF A01 CSCL 13/8

This report covers the effect of multiple shot peening and cadmium plating operations on a high strength steel alloy used in landing gear applications. The basis for determing this effect was fatigue and stress corrosion tests in a high humidity environment. GRA

N80-33562# Naval Research Lab., Washington, D. C. Metal Physics Branch.
A STUDY OF RF NONLINEARITIES IN NICKEL Final Report
G. C. Bailey and A. C. Ehrlich 7 Jul. 1980 15 p refs
(AD-A088770; NRL-MR-4233-Ch-4) Avail: NTIS HC A02/MF A01 CSCL 09/4

The purpose of this chapter is to present a new technique for studying the behavior of nonlinear metallic systems subjected to radio-frequency magnetic fields. Intermodulation (intermod) generation (IMG), which takes place in a nonlinear system results in the excitation of a whole series of signals and the intermod frequencies which are excited depend on the type of nonlinearity of the system. The significance of this technique is its large relative sensitivity; that is, extremely small intermod signals (as low as the RF thermal noise in a system) can be observed in the presence of very large fundamental signals. For example, RF powers of the order of - 145 dBm (i.e., 10 to the minus 17.5 power W) can be observed in the presence of fundamental frequencies with powers of the order of watts or tens of watts. Thus, a relative sensitivity of 10 to the minus 18.5 power to 10 to the minus 19 power or better is possible. Thus, it may be possible to investigate at new levels of detail those physical phenomena accompanied by nonlinear electromagnetic responses. Although the technique is quite general and applicable to the study of a large number of nonlinear metallic systems, the one we have chosen initially for illustrative purposes is that of a ferromagnetic material, namely, nickel that is electroplated onto copper. Electroplated nickel was chosen for three reasons: first, one would expect that nickel, being a ferromagnet and hence nonlinear, should exhibit appreciable intermodulation signals; second, no information was available on the fundamental origins of intermod signals in nickel nor indeed in any ferromagnetic material up to the time the present study was begun. GRA

N80-33563# Illinois Univ. at Urbana-Champaign, Urbana. Dept. of Metallurgy and Mining Engineering.
CORROSION OF FIBER COMPOSITES WITH ALUMINUM ALLOY MATRIXES Final Report, 8 Nov. 1976 - 7 Nov. 1979
M. Metzger 8 Aug. 1980 9 p refs
(Grants DAAG29-77-G-0025; DAAG29-79-G-0019; DA Proj. 1L1-61102-BH-57)
(AD-A088564; ARO-14350.7-MS) Avail: NTIS HC A02/MF A01 CSCL 11/4

In experimental Al-Mg composites with alumina fibers, preferential pitting at fibers and enchanced corrosion rates were observed and explanations given of their relation to segregation in the solidification structure. Some of the corrosion of an Al-Li composite with alumina fibers are reported. Studies of Al-Fe alloys with a cathodic phase showed the rate of pitting to be sensitive to microstructure and fine continuous structure to give rapidly accelerating corrosion. Equations for corrosion time in continuous and discontinuous structures were derived in terms of quantitative metallography parameters with certain assumptions regarding pit nucleation and growth. Discontinuous structures were superior from the viewpoint of corrosion. R.K.G.

N80-33564# Princeton Univ., N. J. Plasma Physics Lab.
MECHANISMS RESPONSIBLE FOR TOPOGRAPHICAL CHANGES IN PLT STAINLESS STEEL AND GRAPHITE LIMITERS
S. A. Cohen, R. Budny, G. M. McCracken (Culham Lab., Abingdon, England), and M. Ulrickson Jun. 1980 70 p refs
(Contract W-7405-eng-36; DE-AC02-76CH-03073)
(PPPL-1671) Avail: NTIS HC A04/MF A01

Damage to PLT limiters used during ohmic and neutral beam heated discharges is described. The damage is explained by the power and momentum fluxes of bulk plasma and beam ions and by disruptions. The plasma scrap-off distance inferred from the extent of the damage ranges from 5 to 30 mm and is consistent with a radially outward drift velocity 20,000 mm/sec. A model of the plasma scrape-off is presented which explains the pattern and extent of the damage. DOE

N80-33565# Brown Univ., Providence, R. I. Div. of Engineering.
COMBINED MACROSCOPIC AND MICROSCOPIC APPROACH TO THE FRACTURE OF METALS Technical Annual Progress Report, 1979 - 1980
J. Needleman, R. J. Asaro, J. Gurland, and J. R. Rice Jun. 1980 56 p refs
(Contract DE-AC02-80ER-10556)
(DOE/ER-10556/1; COO-3084-79; TR-79) Avail: NTIS HC A04/MF A01

Extremely good theoretical experimental correlation was found between our theoretical predictions based on asymptotic analysis with numerical finite element studies and the experimentally monitored crack growth for a large range of stable crack growth in 4140 steel. A theoretical model was developed for the critical conditions of crack initiation at rigid particles as a precursor of ductile rupture in steels. As part of environmentally sensitive fracture mechanisms, it was found that hydrogen can promote a ductile to brittle fracture transition with increasing charging current density in low carbon steel. A variational principle was established for the combined processes of plastic creep flow and grain boundary diffusion and has been constructively applied to the problem of cavity growth under creep conditions. DOE

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N80-33566 New York Univ., N. Y.
RADIATION-INDUCED GRAFT POLYMERIZATION OF STYRENE ONTO CELLULOSE ESTERS Ph.D. Thesis
Jiunn Tsay 1980 118 p
Avail: Univ. Microfilms Order No. 8023740

The kinetics of mutual radiation graft polymerization of styrene onto cellulose acetate butyrate was studied over a range of radiation intensities and monomer concentrations. The reaction was diffusion free under the experimental conditions as shown by the independence of the grafting rate on film thickness. The dependence of the grafting rate on monomer concentration increases from 3/2 order to slightly greater than 5/2 order with increasing radiation intensity. The dependence of the grafting rate on radiation intensity decreases from 1/2 order to 0 order with decreasing monomer concentration. The results do not follow the usual kinetic expression for free radical chain polymerization. The preparation of the polymer film, usual initiation process, and combination of primary termination and bimolecular termination for these kinetic results are presented and discussed.
Dissert. Abstr.

N80-33567 Case Western Reserve Univ., Cleveland, Ohio.
VINYL ACETATE EMULSION POLYMERIZATION KINETICS AND MECHANISM Ph.D. Thesis
Kuanhsiung Chang 1980 298 p
Avail: Univ. Microfilms Order No. 8021682

The kinetics and mechanism of vinyl acetate emulsion polymerization was studied by considering most of the possible variables, i.e., type of soap, concentration of soap, ionic strength, monomer volume particle concentration, and initiator concentration. A kinetic model based on the elementary chemical reactions was presented. The expression for the rate of polymerization based on the model predicts the dependencies of polymerization rate on all experimental variables. The integrated equations follow the polymerization curves over the whole monomer range for the whole parameter range. The numbers and diameters of particles of poly (vinyl acetate) lattices were determined by quasielastic laser light scattering considering the polydispersity effect. It was found that the soap impurity retarded the polymerization because it underwent degradative chain transfer. The particle generation as a function of conversion and soap concentration (sodium lauryl ethoxylate sulfate) in unseeded polymerization was studied.
Dissert. Abstr.

N80-33568 Case Western Reserve Univ., Cleveland, Ohio.
STUDIES OF UNIFORM SPHERICAL COLLOIDS PREPARED BY EMULSION POLYMERIZATION Ph.D. Thesis
Yohannes Chonde 1980 138 p
Avail: Univ. Microfilms Order No. 8021683

Emulsion polymerization techniques were used to prepare model colloidal suspension of polymer lattices with controllable particle size and surface charge. Monodispersed stable lattices with reactive chloromethyl surface functionalities were prepared in the presence of mixed surfactants using vinylbenzyl chloride in various ways: as a homopolymer; crosslinked with divinylbenzene; copolymerized with styrene; and overpolymerized onto uniform polystreme latices. Ways to control the amount of water soluble polyelectrolyte produced as a result of the sulfonation reaction are also discussed. Surfactant-free emulsion polymerization of styrene with sodium vinylbenzyl sulfonate comonomer was studied in the presence of water methanol mixtures. In most methods of emulsion polymerization, some water soluble oligomers are formed. Methods for detection, quantitative determination and removal of water soluble oligomers from latices are discussed. Radiotracer techniques were employed to compare the effectiveness of ultracentrifugation with other methods commonly used to remove impurities from a latex.
Dissert. Abstr.

N80-33569 North Carolina State Univ. at Raleigh.
SORPTION, TRANSPORT AND DILATOMETRIC STUDIES IN GLASSY POLYMERS Ph.D. Thesis
Gautam Ramchandra Ranade 1980 168 p
Avail: Univ. Microfilms Order No. 8020543

Sorption isotherms for water vapor in glassy polyacrylonitrile (PAN) were measured at temperatures from 15 C to 45 C. The transient and steady state permeation of water vapor through PAN at various activities at temperatures from 15 C to 45 C was also studied. The transport data indicated that non-Fickian processes were present. Therefore, sorption kinetics for the PAN/H2O system at various activities at temperatures from 15 C to 45 C were also studied to clarify the nature of water transport in PAN. At all temperatures the sorption isotherms were nonlinear and exhibited dual mode sorption at lower activities. A Zimm-Lundberg type analysis of the sorption data indicated clustering of water molecules at higher activities. The Langmuir sorption capacity, the Flory-Huggins parameter, the heat of solution, permeability, and diffusion were among the factors investigated. Diatometric measurements were made on a series of methacrylate polymers. These data were used to estimate the amount of excess free volume in glassy methacrylate polymers.
Dissert. Abstr.

N80-33570*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TACKIFIER FOR ADDITION POLYIMIDES
John M. Butler (Virginia Polytechnic Inst. and State Univ., Blacksburg) and Terry L. St.Clair Oct. 1980 15 p refs
(Grant NsG-1428)
(NASA-TM-81883) Avail: NTIS HC A02/MF A01 CSCL 11G

A modification to the addition polyimide, LaRC-160, was prepared to improve tack and drape and increase prepeg out-time. The essentially solventless, high viscosity laminating resin is synthesized from low cost liquid monomers. The modified version takes advantage of a reactive, liquid plasticizer which is used in place of solvent and helps solve a major problem of maintaining good prepeg tack and drape, or the ability of the prepeg to adhere to adjacent plies and conform to a desired shape during the lay up process. This alternate solventless approach allows both longer life of the polymer prepeg and the processing of low void laminates. This approach appears to be applicable to all addition polyimide systems.
Author

N80-33571*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POLYIMIDES: THERMALLY STABLE AEROSPACE POLYMERS
Anne K. St.Clair Oct. 1980 19 p
(NASA-TM-81884) Avail: NTIS HC A02/MF A01 CSCL 07C

An up to date review of available commercial and experimental high temperature polyimide resins which show potential for aerospace applications is presented. Current government research trends involving the use of polyimides as matrix resins for structural composites are discussed. Both the development of polyimides as adhesives for bonding metals and composites, and as films and coatings for use in an aerospace environment are reviewed. In addition, future trends for polyimides are proposed.
Author

N80-33572# Electronics Research Lab., Adelaide (Australia).
THE ACTION OF WATER VAPOUR ON ION IRRADIATED ALKALI SILICATE GLASSES
E. H. Hirsch and T. R. Adams May 1980 22 p refs
(AD-A089023; ERL-0075-TR; AR-001-662) Avail: NTIS HC A02/MF A01 CSCL 11/2

The surface of ion irradiated alkali silicate glasses is sensitized to chemical attack by atmospheric water vapour. After initial evolution of hydrogen, this attack leads to the slow conversion of certain regions on the glass surface to water soluble corrosion products. The observations suggest that the regions involved in this conversion are particles of a second phase, distributed throughout the main matrix, and they point to the importance of phase separation in determining the stability of glasses under irradiation.
GRA

N80-33573# Systems Research Labs., Inc., Dayton, Ohio. Research Applications Div.
DYNAMIC EVALUATION OF EXPERIMENTAL INTEGRAL

FUEL-TANK SEALANTS, PART 1 Annual Technical Report, 3 Jul. 1978 - 3 Jul. 1979
Lee E. Isom Dec. 1979 31 p refs
(Contract F33615-78-C-5098; AF Proj. 2421)
(AD-A088573; AFML-TR-79-4193-Pt-1) Avail: NTIS HC A03/MF A01 CSCL 11/1

Experimental integral fuel-tank sealant materials were evaluated under laboratory conditions which closely simulate those of actual aircraft integral fuel tanks during flight. A unique facility was designed and fabricated for the evaluation of a variety of joint configurations. The facility consists primarily of two separate biaxial stress machines in which temperature, pressure, and vibrational strain can be programmed for automatic operation. Specimens can be strained longitudinally and torsionally to simulate actual flight conditions. Frequency and amplitude of the strains can be independently set and recorded. Simulated fuel-tank and environmental pressure can also be adjusted independently. Early difficulties with sealant failure detection and with undesirable thermal strains were resolved and preliminary evaluations of continuous fillet specimens utilizing two sealant materials were performed. J.M.S.

N80-33574# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
PREPARATION OF HOMOGENEOUS LIVING POLYVINYL GELS WITH APPLICATION TO SOLVENT PURIFICATION
F. S. Bates and R. E. Cohen Jun. 1980 24 p refs
(Contract N00014-77-C-0311; NR Proj. 356-646)
(AD-A088883; TR-5) Avail: NTIS HC A02/MF A01 CSCL 07/3

A method is presented for maintaining a high level of purity in organic solvents to be used in anionic polymerization. The development of this technique has entailed synthesis of structurally unique polyvinyl gels which are labile to anionic initiation. Preparation of macroscopic homogeneous gels from divinylbenzene (DVB) and ethylstyrene (ES) is shown to result in the immobilization of a significant amount of residual vinyl groups. Conditions necessary for eliminating unwanted syneresis during the gelation include initiation of the reaction with butyllithium and polymerization in a nonpolar solvent (e.g. benzene) to which an appropriate amount of tetrahydrofuran (THF) has been added. The success of this method in obtaining the desired product is attributed to the influence of the THF on the polymerization of DVB; a mechanism is proposed and experimentally supported which accounts for the observed results. Author

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N80-33575 British Library Lending Div., Boston Spa (England).
THE PRESSURIZED FLUIDIZED BED GASIFICATION OF COAL CHAR
S. Honma Jun. 1980 12 p ref Transl. into ENGLISH from Nenryo Kyokai-shi (Japan), v. 58, no. 3, 1979 p 219-224
(BLL-RTS-12347) Avail: British Library Lending Div., Boston Spa, England

Experiments on the pressurized fluidized bed gasification of Pacific coal char are described and the relation between operating factors, such as pressure and feed rate of air, and the calorific value of the gas produced and the throughput of material is classified. The relation between carbon utilization and heat conversion ratio is discussed. S.F.

N80-33576 British Library Lending Div., Boston Spa (England).
THE FLUIDIZED BED GASIFICATION OF COAL CHAR
Y. Tazaki and J. Kawabata Jun. 1980 14 p refs Transl. into ENGLISH from Nenryo Kokaishi (Japan), v. 58, no. 3, 1979 p 212-218
(BLL-RTS-12346) Avail: British Library Lending Div., Boston Spa, England

The effect of oxygen concentration of the gasification agent on sintering of ash was investigated. Ash resisted sintering when the oxygen concentration of the gasification agent was reduced. Sintering did not occur at gasification temperatures as high as 1050 C, despite the presence of oxygen, when silica sand was used as fluidizing medium. A gasification process was examined in which the fluidized bed was divided into two stages with a horizontal perforated plate, the first stage functioning as a coal combuster with silica sand as fluidizing medium and the second stage functioning as a coal gasifier utilizing heat from the first stage. Sintering of ash in the first stage was prevented by the silica sand, while in the second stage the partial pressure of oxygen in the gasification agent was virtually zero, and the ash failed to sinter notwithstanding gasification at temperatures up to 1050 C. R.K.G.

N80-33577 Texas Univ. at Austin.
MODELING OF HEAT AND MASS TRANSFER DURING COAL BLOCK GASIFICATION Ph.D. Thesis
Tat Hang Tate Isang 1980 209 p
Avail: Univ. Microfilms Order No. 8021523

The drying of coal, pyrolysis of small coal particles and gas-char reactions are discussed in the content of diffusion and flow of gases in the pyrolyzing coal (porous media). Sophisticated models for drying of a coal block and for diffusion and flow of multi component gaseous mixture through the porous coal matrix are developed and simplifying assumptions are discussed. Dissert. Abstr.

N80-33578 Illinois Univ. at Chicago Circle, Chicago.
SINGLE PARTICLE GAS-SOLID REACTIONS AND THEIR APPLICATION TO MODELING OF FLUIDIZED BED COAL COMBUSTORS AND ASH AGGLOMERATING GASIFIERS Ph.D. Thesis
Amirali G. Rehmat 1980 336 p
Avail: Univ. Microfilms Order No. 8023250

The material and energy balances derived during single and multiple gas solid reactions that take place on a single particle are utilized to (1) model the char combustion, (2) model the gasification of char, (3) establish the conditions for ash agglomeration during combustion and gasification, and (4) verify the direct oxidation model for char combustion. The shrinking core model was employed. The reaction resistances accounted for include the intraparticle diffusion resistance, the intermolecular diffusion resistance, the reaction rate, and the interphase diffusion. Analysis of single and multiple gas solid reactions revealed that the particle growth has a significant influence on reaction time when the diffusion resistance controls the overall rate of reaction. The solution of the unsteady state heat balance equation shows that the particle core temperature is greatly influenced by the heat of reaction, the size of the particle, the partial pressure of the gaseous reactant, the particle growth factor, and the ambient temperature. This information is translated into the design of an ash agglomerating coal gasifier and extended to modeling of the fluidized bed processes. Dissert. Abstr.

N80-33579# Chemical Engineering Research Group, Pretoria (South Africa).
PREPARATION AND STABILITY OF EMULSIONS OF METHANOL IN AUTOMOBILE DIESEL OIL
C. G. McCormack Oct. 1979 32 p refs
(CSIR-CENG-294; ISBN-0-7988-1730-5) Avail: NTIS HC A03/MF A01

Short term emulsification of up to 20% methanol in diesel oil (stability lasting a few hours) is feasible but the emulsifiers successful in this respect are costly and have to be applied in relatively high concentrations. No emulsifier was found which produces an emulsion with long term stability; mutual solubilities of the various components and solubility changes with temperature were identified as the most important causes. It is unlikely than an emulsifier will be found which produces stable temperature insensitive emulsions of methanol in diesel oil. Even if such a emulsifier exists, the required amount of and costs are expected to be prohibitive in a fuel application. Author

N80-33580# Committee on Science and Technology (U. S. House).
OVERSIGHT: ALTERNATE LIQUID FUELS TECHNOLOGY
Washington GPO 1979 722 p refs Hearings before the

Subcomm. on Energy Develop. and Appl. of the Comm. on Sci. and Technol., 76th Congr., 1st Sess., no. 33, 5-7 Jun. 1979 (GPO-50-313) Avail: SOD

Testimony is provided on alternate liquid fuels for petroleum, and their role in furthering independence from foreign imported oil. Two facets of the problem considered are economic security with respect to transportation fuels for the civilian sector, and mobility fuels for the national defense apparatus. Commercial synthetic liquid fuels technologies are emphasized. J.M.S.

N80-33581# Committee on Science and Technology (U. S. House).

OVERSIGHT: COST ESTIMATION TECHNIQUES FOR EMERGING SYNTHETIC FUELS TECHNOLOGY, VOLUME 9

Washington GPO 1979 49 p Joint hearings before the Subcomm. on Energy Develop. and Appl. of the Comm. on Sci. and Technol., the Subcomm. on Oversight and Invest. and the Subcomm. on Energy and Power of the Comm. on Interstate and Foreign Com., 96th Congr., 1st Sess., no. 34, 16 Jul. 1979 (GPO-51-721) Avail: SOD

The inherent uncertainties surrounding a crash program to commercialize synthetic fuels are discussed. Statements concerning the energy and other opportunities which would be foregone by a massive open ended commitment of capital to this particular option are presented. E.D.K.

N80-33582# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).

DISCUSSION ON EXPLOSION HAZARDS

H. G. Wagner, ed., H. J. Pasman, D. J. Lewis, and A. W. Preus Dec. 1979 118 p refs Proceedings of 7th Intern. Colloq. on Gasdyn. of Explosions and Reactive Systems, Goettingen, West Germany, 20-24 Aug. 1979

(MPIS-23/1979; ISSN-0436-1199) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

Descriptions of research programs planned or in progress in 11 nations in the field of vapor cloud explosions are given. Topics include large and small scale field studies with hydrocarbon vapors, hazards in the Suez canal, dust explosions, gas explosions effects in a nuclear reactor vessel, mathematical modeling and wind tunnel tests of gas turbulence effects, and flame propagation. For individual titles, see N80-33583 through N80-33595.

N80-33583# McGill Univ., Montreal (Quebec).

RESEARCH ON VAPOR CLOUD EXPLOSIONS AND RELATED PHENOMENA IN CANADA

I. O. Moen and J. H. S. Lee *In* Max-Planck Inst. Fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 25-33 refs (For primary document see N80-33582 24-28)

Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

Government, industry, and university programs are described, including an investigation into the combustion properties of hydrogen-air-steam under confinement, particularly regarding the pressure transients. Vapor cloud explosion research is being conducted emphasizing turbulent flame propagation in the presence of obstacles, determination of detonability limits under various conditions of confinement and turbulence, and determination of criteria for a combustion to give transition into detonation. Also being studied are: computational methods for various modes of combustion, investigation of detonation propagation through media of nonuniform fuel composition, and fire spread characteristics through nonhomogeneties formed under the combined effect of diffusion and buoyancy. Author (ESA)

N80-33584# Cairo Univ. (Egypt). Faculty of Engineering.

EXPLOSION HAZARDS IN THE SUEZ CANAL: AN OVERVIEW

M. M. Kamel *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 34-39 refs Sponsored in part by Cairo Center of Combustion, Energy Conversion and Flow Res. (CEFR) (For primary document see N80-33582 24-28)

Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

The explosion danger that the densely populated Suez Canal Zone is subjected to due to the passage of super-tankers and liquefied natural and petroleum gas carriers is discussed. Accidental causes of explosions are enumerated, different scenarios leading to the detonation of explosive fuel-air clouds resulting from liquefied gaseous fuel spills are presented, and possible avenues of research in this field are outlined.

Author (ESA)

N80-33585# Centre National de la Recherche Scientifique, Poitiers (France). Lab. d'Energetique et de Detonique.

UNCONFINED HYDROCARBON AIR MIXTURE EXPLOSION STUDIES PERFORMED IN FRANCE BY CEA-EDF-GDF AND THE UNIVERSITY

J. C. Leyer *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 40-45 refs (For primary document see N80-33582 24-28)

Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

The analysis of the blast effects produced by the detonation of ethylene, acetylene and propane-air mixtures was studied in balloons of volumes between 1 and 250 cu m. The trajectory of the Mach stem was observed as well as the blast wave propagation behavior including reflection effects from the ground surface. It was found that there was a marked effect on the pressure field of the initial volume of the fuel mixture. The acceleration of various fuel and air mixtures in the deflagration mode within soap bubbles of up to 20 cm radius was investigated. The various mixtures produced flame velocities in the range of 1 to 150 meters/second. Initiation was with a low energy spark in the center when spontaneous acceleration for a uniform mixture was observed. If however a mixture step change was produced by a more energetic mixture in a central zone, an imposed acceleration for the outer mixture was obtained. A theoretical analysis of the behavior can be made for the case of spontaneous acceleration by using the constant velocity flame solution and adjusting the flame velocity in successive steps. This tends to give underestimates of the peak overpressure but overestimates of the positive impulse. Author (ESA)

N80-33586# Battelle Inst., Frankfurt am Main (West Germany).

EXPLOSION HAZARDS OF TRANSPORT GASES: RESEARCH WITHIN THE REACTOR SAFETY PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY

W. Geiger *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 46-59 (For primary document see N80-33582 24-28)

Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

A research program is described which considers explosion behavior under unconfined conditions. Studies were undertaken of the mechanisms by which a quasi-detonation unconfined vapor cloud explosion can take place. Also under investigation are the interaction relationships between the characteristic parameters of an incident pressure wave and the structural response of nuclear power plant complex structures, and the determination of the pressure wave characteristics of a real gas cloud which detonated. This would be nonhemispherical in shape and nonhomogeneous in composition. Author (ESA)

N80-33587# Gesellschaft fuer Hochtemperaturreaktor-Technik m.b.H., Bensberg (West Germany).

THE GAS CLOUD EXPLOSION PROGRAM ON THE PNP-PROJECT

K. Schulte *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 60-68 (For primary document see N80-33582 24-28)

Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

The dynamics and effects of explosions of escaping gas from coal gasification plants are being studied as part of a reactor safety program. Attempts are being made to define the values of pressure and pressure-time profiles which are applicable to typical gas explosions and to understand the interaction of such pressure waves with typical structures. The gas release and cloud formation stages plus ignition, laminar combustion, and acceleration due to turbulence are being studied in order to calculate the pressure and velocity fields resulting from the explosion. Flame acceleration and pressure enhancement were identified

as arising from six possibilities. Two of these are studied in depth: combustion supported flame acceleration and the effect of eddies around structures whereby the flame encloses unburnt material in a vortex pattern. Some small scale studies of this effect were shown to give laminar flame acceleration effects of 2 or 3 fold increase, but no pressure measurements were made. Experiments were carried out in a vortex chamber to measure velocities. Some large scale experiments of hydrogen and air in hemispherical balloons were carried out which confirmed theoretical predictions. Author (ESA)

N80-33588# Health and Safety Executive, Sheffield (England). Explosion and Flame Lab.
RESEARCH ON VAPOR CLOUD EXPLOSIONS IN THE UNITED KINGDOM
H. Phillips *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 69-70 (For primary document see N80-33582 24-28)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

Studies are under way in risk assessment, formation of vapor clouds, cloud dispersion and modeling hypothetical clouds to determine how combustion blasts develop. Other programs include flame acceleration, effects of variations in fuel concentration on combustion behavior, and combustion problems and flame behavior in the presence of turbulence. Author (ESA)

N80-33589# Tokyo Univ. (Japan). Inst. for Safety of High Pressure Gas Engineering.
A FILM OF LARGE SCALE FIELD EXPERIMENTS ON ETHYLENE HAZARDS
Tsutomu Hikita *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 72-74 refs (For primary document see N80-33582 24-28)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

The film is comprised of four parts: dispersion of liquid ethylene (312 kg) in an open pit in a 2.5 m/sec wind; control of a liquid ethylene fire; heating of an insulated tank containing 2.3 cu m of ethylene with an external propane fire; two ethylene-air explosion experiments were conducted in a building with a volume of 48 cu m having PVC film walls and roof over a steel framework. The ethylene concentration averaged 7.2% v/v which was ignitied by a pentolite charge of weight 20 g. One test at this concentration gave a detonation whereas another run at 9.1% v/v ethylene had the characteristics of a deflagration. This was compared with an earlier experiment of 7.4% v/v ethylene in air inside a similar building of 770 cu m volume. This result clearly gave a true detonation. Author (ESA)

N80-33590# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
SOME COMMENTS ON THE DISCUSSION ON EXPLOSION HAZARDS
H. J. Pasman *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 75-78 (For primary document see N80-33582 24-28)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

Areas of research on explosion hazards were identified where more research needs to be done. Mentioned were: analysis of flame behavior in stratified gas clouds, multiple ignition sources, ignition power, and total igniting surface. Also, quantitative classification of fuels according to reactivity, deflagration of sprays and aerosols, damping effects of water mist, detonation wave quenching, detonation wave modeling, and the effects of shock waves on structures. Author (ESA)

N80-33591# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
DESCRIPTION OF RESEARCH RELATED TO VAPOR CLOUD EXPLOSIONS IN THE NETHERLANDS
J. P. Zeeuwen *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 79-81 (For primary document see N80-33582 24-28)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

A simple vapor cloud explosion model was developed for industrial users, which can predict the blast overpressure characteristics from the amount and kind of fuel present in the cloud and the local structures. Spherical flame propagation is being studied in a 1 cu m vessel and linear propagation in tubes up to 24 m in length with a cross section 22 cm x 22 cm. Flame acceleration and possible transition to detonation are also being examined. Author (ESA)

N80-33592# Christian Michelsens Institutt for Videnskap og Andsfrihet, Bergen (Norway).
LARGE SCALE GAS EXPLOSION EXPERIMENTS IN NORWAY
Rolf K. Eckhoff *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 82-89 (For primary document see N80-33582 24-28)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

Flame propagation and pressure development are being studied in alkane-air mixture explosions in confined and semiconfined geometry. An explosion tube 2.5 m in diameter and 10 m long was constructed. The tube and gas filling system are described. Turbulence effects will be studied. A series of propane-air explosion tests indicate that the classical explosion venting type of volume scaling is invalid. Proposed full scale dust venting explosion tests in a 500 cu m silo are mentioned. Author (ESA)

N80-33593# R and D Associates, Marina Del Rey, Calif.
PERSPECTIVES ON RESEARCH ON LNG VAPOR CLOUD DISPERSION
Allen L. Kuhl, H. J. Carpenter, F. R. Gilmore, and E. J. Chapyak (LASL) *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 90-99 refs (For primary document see N80-33582 24-28)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

Field experiments, wind tunnel simulations, and mathematical models of cloud dispersion are described. Field experiments were not useful for predicting vapor cloud characteristics from large spills. Considerable differences also exist between model results for large spills. The physical effects important to vapor cloud dispersion include gravity spreading, turbulence effects, inhibiting effects of the cold gas on turbulent mixing, and the nature of the atmospheric boundary layer. Further research is suggested with better models, scaled experiments, and wind tunnel tests to check scaling problems. Author (ESA)

N80-33594# California Univ., Berkeley. Lawrence Berkeley Lab.
EVALUATION OF THE EFFECTS OF DETONATION IN A SPHERICAL BOMB
John Kunylo and Antoni K. Oppenheim *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 100-110 refs (For primary document see N80-33582 24-28)
(Contract W-7405-eng-48)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

An analysis was made of the time dependent pressures and impulse loadings on the walls of the hemispherical dome of a nuclear reactor pressure vessel arising from a centrally ignited hydrogen-oxygen detonation. Investigated in this context are the effects of richness of the detonable gas mixture as well as those due to the inclusion of water vapor. The gas mixture was treated as a perfect gas and the partial differential equations governing the gasdynamic flow were integrated using the CLOUD CODE, a finite difference technique set in Lagrangian coordinates and incorporating the smoothing action of artificial viscosity. The most interesting results pertain to the ringing of pressure pulses at the walls. Their frequency is quite uniform and their pressure peaks, at levels significantly higher than that of combustion at constant volume, decay at a negligible rate. Author (ESA)

N80-33595# Army Armament Research and Development Command, Dover, N. J.
VAPOR CLOUD EXPLOSION STUDIES IN THE UNITED STATES
Norman Slagg and Paul A. Urtiew (California Univ., Livermore. Lawrence Livermore Lab.) *In* Max-Planck Inst. fuer Stroemungsforsch. Discussion on Explosion Hazards Dec. 1979 p 111-113

(For primary document see N80-33582 24-28)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,70

Institutions and individuals involved in the liquefied natural gas problem and in large scale dust explosions are identified. Studies are being conducted which are concerned with the mechanisms of flame propagation, the acceleration of flames and dispersion problems under a variety of environmental conditions. Also included are risk analysis studies, unconfined explosions, two phase detonations, blast wave profiles, and dust explosions in coal mines. The technical problem areas can be divided up into the following: mechanisms which cause flame acceleration, initiation requirements, effect of fuel air ratio variations, the estimation of blast and other damage effects, scaling studies, particularly for the plume problem and also for flame acceleration mechanisms. Author (ESA)

N80-33598# Naval Research Lab., Washington, D. C.
APPLICATION OF PICOSECOND AND LIGHT SCATTERING SPECTROSCOPIES TO THE STUDY OF ENERGETIC MATERIALS Interim Report
J. M. Schnur 11 Sep. 1980 54 p refs
(RR0240202)
(AD-A088904; NRL-MR-4323) Avail: NTIS HC A04/MF A01 CSCL 20/5

The goal of this research is to identify advanced optical procedures appropriate for the study of energetic materials and their reactions, develop these techniques as required, assess their utility to the energetic material community, and then aid in the transfer of the appropriate technology to the appropriate user groups. Previous reports have detailed the development of light scattering techniques to study material properties at high pressures. The successful application of this method to the study of complex material problems has recently led to the initiation of two distinct research programs. These are (A) the application of high pressure Raman, FTIR, and Brillouin techniques to study the role of supra molecular structure in determining material strength in polyethelene (now supported by NAVAIR) and (B) the application of high pressure Raman and FTIR in determining the possible effect of pressure in catalyzing decomposition in NOS-365 and other monopropellants. GRA

N80-33597# Naval Weapons Support Center, Crane, Ind.
SPECTRAL DISTRIBUTIONS 5: VISIBLE SPECTRA OF STANDARD AND IMPROVED GREEN FLARE COMPOSITIONS Final Report, 1 Oct. 1979 - 30 Jun. 1980
Henry A. Webster, III 1 Aug. 1980 18 p refs Presented at the 1979 Ann. Meeting of the Pyrotech. and Explosives Appl. Sect. of the Am. Defense Preparedness Assoc., West Point, N.Y., 7-9 Nov. 1979
(WF3354591)
(AD-A089055; NWSC/CR/RDTR-126) Avail: NTIS HC A02/MF A01 CSCL 19/1

Visible spectra from standard Navy green flares and an improved green flare composition are presented and analyzed. The improved green flares are composed of boron, magnesium, barium nitrate, and a binder. Luminous intensities of 71000 cd and efficiencies of 11,000 cd.s/g have been obtained. Dominant wavelengths shorter than those of the standard green flare have also been obtained. Molecular emissions from boron oxides, barium oxides, and barium chlorides and various atomic emission features are observed. GRA

N80-33598# SRI International Corp., Menlo Park, Calif. Chemistry Lab.
FLUORINATED DESENSITIZING INGREDIENTS FOR PROPELLANTS Final Report, 24 Jul. 1979 - 23 Apr. 1980
John M. Guimont 24 May 1980 29 p refs
(Contract N00024-79-C-5653; SRI Proj. PYU-8742)
(AD-A088704) Avail: NTIS HC A03/MF A01 CSCL 21/9

Under the sponsorship of Naval Sea Systems Command, SRI has been investigating the use of partially fluorinated nitrate esters as desensitizing ingredients for propellants. Three nitrate esters were prepared, and preliminary characterization of the first two was completed. GRA

N80-33599# Stone and Webster Engineering Corp., Boston, Mass.
HYDROPROCESSING OF LIGHT PYROLYSIS FUEL OIL FOR KEROSENE TYPE JET FUEL Final Report, 1 Oct. 1978 - 31 Oct. 1979
Alexander Korosi and J. N. Rubin Feb. 1980 70 p refs
(Contract F33615-78-C-2074)
(AD-A089101; S/W-PROC-111579; AFWAL-TR-80-2012) Avail: NTIS HC A04/MF A01 CSCL 21/4

The feasibility of converting light pyrolysis fuel oil (a steam cracking by-product) into jet fuel was assessed. The raw aromatic fuel oil was hydrostabilized and converted into naphthenic products by hydrogenation in pilot plant operation. The fully hydrogenated fuel showed excellent cold properties, high heat of combustion values on volume basis and met nearly all specifications on kerosene-type fuels. Conceptual process design and related economics indicated the product cost was competitive with other petroleum products. This fuel is a new potential source for JP5 or JP8 kerosene type jet fuel. GRA

N80-33600# IIT Research Inst., Chicago, Ill.
TNT EQUIVALENCY TESTING OF CHEMICAL MIXTURES IN CONTINUOUS TNT MANUFACTURING Final Report
Ronald Pape, Joseph Mavec, Richard Joyce, and Paul Price Aug. 1980 211 p refs
(Contract DAAA21-76-C-0221)
(AD-A088903; IITRI-J6379; ARLCD-CR-79013) Avail: NTIS HC A10/MF A01 CSCL 19/1

Tests were conducted to determine the TNT equivalencies of selected chemical mixtures in their process components from continuous TNT production facilities. This report presents the rationale for selecting the components which were tested, the philosophies used in planning and designing the tests, the designs of the simulated process components and supplementary test equipment, the test procedures, the test results, and analysis of the test results. A methodology was developed to correlate the experimental data quite well and thereby be able to predict airblast output produced by other untested process compounds of similar geometry without additional testing. Author

N80-33601# United Technologies Corp., South Windsor, Conn. Power Systems Div.
COAL GASIFICATION COMBINED-CYCLE SYSTEM ANALYSIS Final Report
S. Hamilton, J. Garow, and S. J. Lehman Apr. 1980 178 p refs
(EPRI Proj. 986-2)
(EPRI-AP-1390) Avail: NTIS HC A09/MF A01

The results of a study involving combustion turbine power plants using coal gasification are summarized. Systems integration and the optimization of power plant conceptual design were studied. The objectives include: (1) determining potential levels of thermal efficiency for well integrated gasified coal combined cycle systems; (2) quantifying the effects of varying key design parameters of various components on overall plant performance; and (3) project potential levels of performance made possible by using advanced, combustion turbines and advanced gasifiers. Emphasis was placed on effective waste heat management and practically in synthesizing overall power plant arrangements. Current technology systems were defined which yielded thermal efficiencies in the range of 35 to 37%. It was found that approximately one percentage point in thermal efficiency could be realized by using either the British Gas Corporation (BGC) slagging, fixed bed gasifier or the air blown Texaco gasifier in place of the oxygen blown Texaco gasifier. Two percentage points were gained by increasing the gas turbine combustor exit temperature about 300 F. DOE

N80-33602# JBF Scientific Corp., Wilmington, Mass.
EVALUATION OF PROCESSES FOR PRODUCING GASOLINE FROM WOOD Final Report
May 1980 50 p refs
(Contract DE-AC01-79PE-70048)
(DOE/PE-70048/T2) Avail: NTIS HC A03/MF A01

Three processes for producing gasoline from wood by pyrolysis were investigated. Technical and economic comparisions among the processes were made, based on a hypothetical common plant size of 2000 tons per day green wood chip feedstock. Perspective is provided by comparisons of the wood to gasoline technologies with other similar systems, including coal to methanol

and various biomass to alcohol systems. Several descriptions of energy efficiency were used, but all showed that methanol production from wood, with or without subsequent processing by the Mobil route to gasoline, appears most promising, however, the critical wood to methanol system remains conceptual. Another observation was that the ethanol production systems appear inferior to the wood to gasoline processes. DOE

N80-33603# Mound Lab., Miamisburg, Ohio.
ROLE OF SURFACE CHEMISTRY IN THE IGNITION OF PYROTECHNIC MATERIALS
W. E. Moddeman, L. W. Collins, P. S. Wang, and T. N. Wittberg (Dayton Univ. Research Inst., Ohio) 1980 18 p refs Presented at the 7th Intern. Pyrotechnics Seminar, Vail, Colo., 14 Jul. 1980
(Contract DE-AC04-76DP-00053)
(MLM-2708(OP); CONF-800713-6) Avail: NTIS HC A02/MF A01

The surface chemistry of fuels is shown to play a key role in the ignition of pyrotechnic materials. Since these fuels are usually easily oxidized, the surface must provide protection from undesirable oxidation processes such as pyrophoricity while permitting the desirable pyrotechnic reactions. For both titanium and aluminum, these criteria are met by metal oxide coatings which control the accessibility of the fuel to the oxidizer. However, it is shown that the mechanisms through which this control is exerted are substantially different. The ignition of titanium based pyrotechnics seems to be kinetically controlled by the dissolution of the titanium oxide coating to generate a reactive surface for the pyrotechnic reaction. Reactions of aluminum seem to depend on diffusion of aluminum (or oxygen at higher temperatures) through its oxide coating. It is also shown that the accessibility of aluminum can be improved by alloying. DOE

N80-33604# Mound Lab., Miamisburg, Ohio.
THERMAL AND ELECTROSTATIC INITIATION OF TiH/SUB X BASED PYROTECHNICS
L. W. Collins 1980 11 p refs Presented at the 7th Intern. Pyrotechnics Seminar, Vail, Colo., 14 Jul. 1980
(Contract DE-AC04-76DP-00053)
(MLM-2710(OP); CONF-800713-8) Avail: NTIS HC A02/MF A01

The thermal and electrostatic initiations of TiH/sub x/based pyrotechnics were investigated to determine the material properties which influence these processes. Controlled electrostatic sensitivity experiments showed that the initiation reaction for TiH/sub x/KC104 pyrotechnic involved a reaction of the fuel with oxygen gas an that the KC104 chemically interacts with the titanium to desensitize the material to electrostatic ignition. Other factors which influence the initiation process were also identified. As a result of these experiments, a theory for the titanium oxides which coat the metal particles. Thermal ignition of the TiH/sub x/KC104 was shown to be controlled by chemical processes associated with the titanium fuel. DTA experiments were correlated with Auger spectroscopic measurements to demonstrate the role of the dissolution of the oxide coating in the thermal ignition of titanium. DOE

N80-33605# Battelle Pacific Northwest Labs., Richland, Wash.
OXYGEN/SYSTEM GASIFICATION OF WOOD
L. K. Mudge, D. G. Ham, S. L. Weber, and D. H. Mitchell Apr. 1980 23 p refs
(Contracts EY-76-C-06-1830; DE-AC06-76RL-01830)
(PNL-3353) Avail: NTIS HC A02/MF A01

Yields from fixed bed gasification of solar fuel, pressed planar shavings, are presented for air/steam operation and oxygen/steam operation at four different compositions. The wood carbon distributes between gas products and liquid products in the respective ranges of 75 to 80 wt% and 20 to 25 wt%. The cold gas efficiencies, defined as the combustible energy in the gas divided by the heat of combustion of the wood, were 60% for operation with an air to steam weight ratio of 10, 52%, 61%, 59%, and 52% for operation with oxygen to steam weight ratios of 1/2, 1, 2, and 4 respectively. The other energy inputs to the system are less than the energy output in tar products so that the above efficiencies are about the same as the overall efficiencies. Concentrations of the gas at various heights in the fixed bed are presented. The results indicate that the maximum weight fraction of methanol from dry wood is 0.45 at an oxygen to steam weight ratio of 1 with reforming of the methane in the product gas, or a yield of 135 gallons of methanol per ton of dry wood. The maximum methane yield is obtained at the same oxygen to steam weight ratio of 1 and is 8600 scf/dry ton. DOE

N80-33606# Santa Clara Univ., Calif. Dept. of Mechanical Engineering.
METHANOL/ETHANOL/GASOLINE BLEND FUELS DEMONSTRATION WITH STRATIFIED CHARGE ENGINE VEHICLES Final Report
R. Pefley, H. Adelman, and T. Suga Mar. 1980 135 p refs Prepared for California Energy Commission, Sacramento
(PB80-192123; CAEC-49) Avail: NTIS HC A07/MF A01 CSCL 21D

The performance of four 1978 Honda CVCC vehicles was monitored over a twelve month period. Three of the unmodified vehicles were fueled with alcohol/gasoline blends (5% methanol, 10% methanol, and 10% ethanol) with the fourth remaining on gasoline as a control. The demonstration and testing established the following: (1) the tested blends cause no significant degradation in exhaust emissions, fuel economy, and driveability; (2) the tested blends cause significant increases in evaporative emissions; (3) analysis of periodic oil samples shows no evidence of accelerated metal wear; and (4) higher than 10% alcohols will require substantial modification to most existing California motor vehicles for acceptable emissions, performance, and fuel economy. GRA

N80-33607# National Technical Information Service, Springfield, Va.
HYDROGEN USE AS A FUEL. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jun. 1980
Audrey S. Hundemann Jul. 1980 228 p Supersedes NTIS/PS-79/0779
(PB80-813090; NTIS/PS-79/0779) Avail: NTIS HC $30.00/MF $30.00 CSCL 21D

Federally funded research studies pertaining to the technical feasibility of using hydrogen as a fuel for vehicular transportation, electric power generation, and both subsonic and supersonic aircraft are discussed. Excluded are studies on hydrogen production and storage. These topics are covered in other bibliographies. This updated bibliography contains 206 citations, 20 of which are new entries to the previous edition. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N80-33600 British Library Lending Div., Boston Spa (England).
THE SOLUTION CYCLE IN AN ABSORPTION SYSTEM WITH PRESSURE EQUALISING GAS (THEORETICAL AND EXPERIMENTAL INVESTIGATIONS)
D. Otto May 1980 24 p refs Transl. into ENGLISH from Luft und Kaltetechnik, (Dresden), 2, no. 5, 1966 p 153-158 Presented at the Refrg. Symp., Leipzig, 15 Apr. 1966
(BLL-RTS-12307) Avail: British Library Lending Div., Boston Spa, England

Theoretical explanations, and a description of the methods of measurement used in experimental investigations of the cycle are presented along with which serve for evaluating the predetermination of the cycle in an resorption systems. Author

N80-33609 California Univ., Los Angeles.
SUPERFLUIDITY IN 3He-4He MIXTURE THIN FILMS Ph.D. Thesis
Emilia Webster 1980 88 p
Avail: Univ. Microfilms Order No. 8023377

All results from our experiments studying superfluidity in He-3 and He-4 mixture films are presented. Our measurements spanned the temperature range from 1.3 to 1.8 K, and up to 30% He-3 molar concentration in the film. Films of up to 100 Angstroms thickness were studied. The experimental configuration and procedure are described. Relevant theories are

reviewed. The areal superfluid mass density is given in terms of an experimental measure of the film thickness for all concentrations and temperatures studied. Detailed data from the onset regions are included. Precipitous onset phenomena were observed, and the Kosterlitz-Thouless-Nelson theory conclusively verified. However, no two dimensional phase separation was observed, showing that mixture theories based on the X-Y model need additional refinement to correctly describe multilayer films. Experimental values of the superfluid onset and intercept thickness of He-3 and He-4 mixture films are also exhibited. Analysis of our experimental evidence indicates that this excess normal fluid is due to surface roton excitations which exist at the substrate boundary, with an energy gap of 4.5 K. Author

N80-33610 Rutgers - The State Univ., New Brunswick, N. J.
SIZE EFFECTS IN SUPERFLUID 3He Ph.D. Thesis
Timothy Joseph Chainer 1980 167 p
Avail: Univ. Microfilms Order No. 8022547

The superfluid density and transition temperature of 3He filling the pores of packed alumina powder was measured by fourth sound. The measurements were performed simultaneously for three separate fourth sound resonators, each packed with a different nominal grain size of 1.0, 0.3, and 0.05 micrometers. The bulk 3He superfluid transition temperature, which was determined independently, was compared to the transition temperature of each resonator. We observed a systematic depression for both the superfluid density and transition temperature as the powder size was observed to decrease. The depressions in the transition temperature were compared with theoretical estimates of size dependent transition temperatures for the ideal geometry of an infinite cylinder. In the analysis, the cylinder radius was replaced by defining an average radius of the pore structure which was empirically determined by nitrogen gas sorption and mercury intrusion techniques. The pressure dependence of the transition temperature depression is found to be consistent with theoretical estimates of the superfluid coherence length. Dissert. Abstr.

N80-33611 Ohio State Univ., Columbus.
MATERIAL CHARACTERIZATION FOR STUDYING FLEXIBLE PAVEMENT BEHAVIOR IN FATIGUE AND PERMANENT DEFORMATION Ph.D. Thesis
Mohamad Rashad Nassr Elmilmy 1980 319 p
Avail: Univ. Microfilms Order No. 8022267

Mixtures' performances in fatigue and rutting were investigated. Different aggregates and gradations were studied in these mixtures. The aggregates and gradations chosen were investigated using Marshall design criteria. These aggregates were first evaluated for basic material characteristics such as specific gravity and water absorption for both fine and course fractions. Also, the Marshall stability, density and air voids contents were known at different asphalt contents. To investigate rutting susceptibility for different mixes under study, a dynamic uniaxial loading in which the dynamic stress intensities were varied within a certain range to simulate field conditions was conducted. All mixtures studied in fatigue showed that the crack propagation rate versus stress intensity factors can be represented with a polynomial of a second degree. Statistical relations were developed to correlate the rutting and fatigue parameters under investigation in this study with other mix variables. The rutting parameters were found mostly to be influenced by asphalt contents and aggregate type. The fatigue parameters were found to be affected by asphalt contents, gradations and modulus of elasticity. Dissert. Abstr.

N80-33612*# Public Technology, Inc., Washington, D. C.
IMPROVING BUILDING CONSTRUCTION SPECIFICATIONS IN STATE AND LOCAL GOVERNMENTS
[1980] 51 p
(Contract NASw-3133)
(NASA-CR-163623) Avail: NTIS HC A04/MF A01 CSCL 13B

State and local governments can benefit from master specifications systems that centralize data on all types of building materials, products, and processes. Most of these systems are organized according to the MASTERFORMAT system, which, along with guide specifications that require the insertion or deletion of standardized information, resulted from the specific needs of users and providers. For jurisdictions preparing their own specifications, staff time and cost are reduced. For those subcontracting the preparation, master specifications provide a means of evaluating the specifications submitted. Current management specification systems described include SPECINTACT, OMSPEC, MASTERPEC, and the NAVFAC, Corps of Engineers, and GSA guide specifications. A.R.H.

N80-33613# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
LA RECHERCHE AEROSPATIALE, BI-MONTHLY BULLETIN NO. 1980-1
Jul. 1980 98 p refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 1-75
(ESA-TT-651) Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

A study of the vibration of obstacles in a flow, methods for measuring propellant levels, reverse pseudo unsteady calculation methods, and vacuum ultraviolet spectrography of titanium are discussed. Other topics include in situ experiments in a one MV electron microscope, wind tunnel pressure measurements, and an electrical method for strain and damage measurement. For individual titles, see N80-33614 through N80-33620.

N80-33614# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
VIBRATIONS OF SEVERAL OBSTACLES WITHIN THE TWO DIMENSIONAL FLOW OF INCOMPRESSIBLE FLUID c34
Robert Legendre *In its* La Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 1-12 Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 1-8 Original report in FRENCH previously announced as A80-26158 (For primary document see N80-33613 24-31)
Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

Linearization, justified by the assumption of low amplitude vibration of the obstacles, is invoked to determine their effect by superimposing the fields induced by the local displacements and those induced by the vortex sheets in the wake. The calculation of these elementary fields is made easier by the previous determination of auxiliary functions that are the first type integrals and the theta function associated with the automorphism group in the plane of a uniforming variable. Author (ESA)

N80-33615# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
ULTRASOUND LEVEL-METER FOR MEASURING PROPELLANT LEVELS IN ARIANE TANKS IN ITS FIRST AND SECOND STAGES c35
Jean-Claude Demarais and Alain Deom *In its* La Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 13-30 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 9-22 Original report in FRENCH previously announced as A80-26159 (For primary document see N80-33613 24-31)
Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

Propellant levels in tanks of unsymmetrical dimethylhydrazine and nitrogen tetroxide were measured using signals from a 220 kHz transducer at the tank bottom reflecting from the liquid surface. The measurements are sampled at a frequency of about 20 Hz, which permits detection of relatively rapid variation of the level (55 mm/s) with a precision better than 5 mm within the whole measuring range: 25 cm to 3 m. To avoid measurement perturbations due to temperature variations, and ultrasound reflector was installed in the tanks for calibration. Author (ESA)

N80-33616# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
REVERSE PSEUDO-UNSTEADY AERODYNAMIC CALCULATION METHODS c02
Georges Meauze *In its* La Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 31-40 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 23-30 (For primary document see N80-33613 24-31)
Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

A reverse mode calculation method is described which

provides the geometry of a wall corresponding to a given velocity distribution. The velocity distribution can be assigned on the whole duct wall whose geometry is looked for, or only on an element of it, the remaining being assumed known. The method uses a pseudo-unsteady calculation, which makes it possible to treat the case of flow with shock waves, for a two dimensional flow with possible variation of a duct, such as an air intake or a nozzle, as well as the profiles of turbomachine blades. This method can also contribute to the understanding and exploitation of experimental results, making it possible to determine the flow field corresponding to the measured wall pressure distributions. Author (ESA)

N80-33617# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

THE ONERA VACUUM ULTRAVIOLET SPECTROGRAPH AND ITS USE FOR THE STUDY OF SURFACE LAYERS IN TITANIUM AND ITS ALLOYS c35

Frima Malamand and Bernard Daigne *In its* La Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 41-49 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 31-37 Original report in FRENCH previously announced as A80-26161 (For primary document see N80-33613 24-31)

Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

The spectrograph permits the exploitation of a broad spectral region, covering the ultraviolet and vacuum ultraviolet ranges. The use of a high energy source makes possible the simultaneous measurements of the constituent contents in an alloy, from a few ppm to several percent. This analysis process permits the determination of the concentration of several elements on metallic layers only a few microns thick involving a small quantity of matter. Variations of oxygen, nitrogen, carbon and hydrogen concentrations, on titanium and TA6V samples were studied as a function of various modes of preparation or surface treatment. Author (ESA)

N80-33618# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

IN SITU EXPERIMENTS IN THE 1 MV ELECTRON MICROSCOPE. PART 1: FEASIBILITY AND METHODOLOGY c35

Roger Valle, Bernard Genty, and Alain Marraud *In its* La Rech. Aerospatiale Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) p 51-80 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 39-61 (For primary document see N80-33613 24-31)

Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

The history of electron microscopy is reviewed, including the physical and experimental approach followed in the design of equipment for in situ experimentation. The problems of extended observations at high temperatures and specimen oxidation are examined. The factor influencing the design of the vacuum system and the specimen chamber are presented. The evolution of techniques and apparatus for observing thick specimens and for the recording of dynamic phenomena are described, including: sensitivity and resolution requirements of the television camera tube, the development of an aluminum foil screen, and the television camera optical system. A technique is described for recording on 16 mm motion picture film the television image stored on magnetic tape. Two frames of the television image are registered on each film frame. Author (ESA)

N80-33619# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

A DIGITAL UNIT FOR MEASURING UNSTEADY PRESSURE COEFFICIENTS c35

Claude Christoux and Alain Gravelle *In its* La Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 81-88 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 63-68 Original report in FRENCH previously announced as A80-26162 (For primary document see N80-33613 24-31)

Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

The large capacity system receives simultaneous data from miniature piezoresistive transducers, computes the Fourier transform of the displacement signal and of the pressure signals for each channel, and stores the coefficients on disk. The system is based on an HP 2100 minicomputer, an HP 5451 B Fourier analyzer, with an in house designed 16 channel multiplexer. The unit has a capacity of 240 channels and a bandwith between 5 and 1250 Hz. A comparison is made with the analog unit which it replaces. Author

N80-33620# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

AN ELECTRICAL METHOD OF MEASURING STRAIN AND DAMAGE c35

Georges Cailletaud, Humbert Policella, and Georges Baudin *In its* Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 89-97 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 69-75 (For primary document see N80-33613 24-31)

Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

It is shown that, by using an appropriate analysis method, the potential drop technique can be applied to the measurement of strain and damage on actual complex structures. The proposed method is applied to the simple case of push-pull specimens and the results are compared with those obtained with classical methods. Agreement is good for various materials, specimen shapes, and temperature ranges. Author (ESA)

N80-33621# Spire Corp., Bedford, Mass.

RESEARCH ON LOW TEMPERATURE, DIRECTED ENERGY PROCESSING OF VERY LARGE SCALE INTEGRATED STRUCTURES Semiannual Technical Report, 1 Jan. - 30 Jun. 1980

Anton Greenwald Jul. 1980 44 p refs

(Contract MDA903-79-C-0212)

(AD-A088562; SAR-80-10065-02) Avail: NTIS HC A03/MF A01 CSCL 09/5

The use of low temperature pulsed electron beam surface heating eliminates the need for high temperature thermal cycling of silicon wafers in fabricating very large scale integrated (VLSI) devices. Results using pulsed annealing techniques to fabricate: (1) low leakage diodes; (2) ion-implanted resistors defined by thin (2.5 micron) oxide windows; and (3) small geometry patterns to measure lateral diffusion of dopants are presented. Comparison to high temperature thermal processing was favorable. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

N80-33622 British Library Lending Div., Boston Spa (England).

METHODS OF DIGITAL SPEECH SIGNAL TRANSMISSION

Klaus Fellbaum Feb. 1980 19 p refs Transl. into ENGLISH from NTZ-Nachrtech. Z. (West Germany), v. 32, no. 9, 1980 p 603-607

(BLL-RDL-Trans-3798-(7737.470)) Avail: British Library Lending Div., Boston Spa, England

An overview and assessment of compression methods for speech signal reduction is presented. Specifically, the signal shape coding methods, analysis/synthesis methods, and the recognition and synthesis methods are addressed. M.G.

N80-33623 British Library Lending Div., Boston Spa (England).

THE TRANSMIC SYSTEM. 1: GENERAL PRINCIPLES AND PRESENTATION

Jean-Marie Gauthier, Alain Texier, Jean Lachaise, and Luc Guillet Dec. 1979 21 p refs Transl. into ENGLISH from Cables et Transmission (France), Oct. 1978 p 447-460

(BLL-RDL-Trans-3766-(7737.470)) Avail: British Library Lending Div., Boston Spa, England

The communications system, TRANSMIC, which is based on digital transmission techniques is described. The TRANSMIC system is made up of equipment designed for integration into the telecommunications network of the PTT (French Posts and Telecommunications Administration) to complement existing digital equipment and to provide services other than the telephone.

the main one of which consists of a point-to-point synchronous digital data link service. The development of equipment for accessing a PCM telephone channel at a digital rate of 64 kbit/s is discussed. The TRANSMIC long distance digital media and the network synchronization techniques are also examined and a review is made of possible future developments. M.G.

N80-33624 British Library Lending Div., Boston Spa (England).
THE TRANSMIC SYSTEM. 3: OPERATIONS, AVAILABILITY AND QUALITY OF SERVICE
Michel Huet, Jean Francois Dunand, and Rene Dupuy Dec. 1979 31 p refs Transl. into ENGLISH from Cables et Transmission (France), Oct. 1978 p 468-489
(BLL-RDL-Trans-3765-(7737.470)) Avail: British Library Lending Div., Boston Spa, England

The system units of the TRANSMIC digital communication system are described in their installation context; the levels of integration of the TRANSMIC links are defined within the general transmission network; and the general operations and maintenance principles and the main technological characteristics of the units concerned are presented. An assessment is made of the quality of service and results obtained on several links used in service and under experimental conditions. Lastly, some options and decisions with regard to procedures which would increase system availability are described. M.G.

N80-33625 British Library Lending Div., Boston Spa (England).
FREQUENCY RE-USE BY POLARIZATION ON DIVERSITY ON SATELLITE LINKS
C. Zufferey Nov. 1978 28 p Transl. into ENGLISH from Tech. Mitt. PTT, (Bern), no. 4, 1978 p 140-150
(BLL-Trans-3663) Avail: British Library Lending Div., Boston Spa., England

From the theoretical point of view, the realization of systems using the principle of reuse of frequencies does not present any insoluble problems. The fact is that no one form of polarization can really be adopted with absolutely decisive advantages. Several possible arrangements which enable the reuse of the same frequency band in the case of satellite links are discussed. R.K.G.

N80-33626 British Library Lending Div., Boston Spa (England).
ALTERNATIVES FOR THE DEVELOPMENT OF FUTURE TELEVISION SYSTEMS
Broder Wendland Jun. 1980 26 p refs Transl. into ENGLISH from 7th E K T G Conf. proc. p 1-22 Presented at 7th E K T G Conf.
(BLL-RTS-12332) Avail: British Library Lending Div., Boston Spa, England

The results of Japanese investigations into subjective perception picture quality are used as the starting point for developing a high definition television system. Parameters for such a system include high detail definition, line free picture representation, convenient picture ratio (5:3); no cross color interference, and no cross luminance interference. The Japanese concept to correct current deficiencies involves increased number of lines, increased bandwidth and increased capacity requirement with all the associated consequences and no apparent compatibility with existing systems. The possibility of achieving an improvement in picture quality essentially compatible with present TV system, but using new techniques is considered, as well as the restrictions and limitations. Such approaches discussed include the use of digital signal processing techniques, and highly complex systems, including receivers, using the VLSI technique. A.R.H.

N80-33627 Colorado Univ. at Boulder.
PRECISE PREDICTIONS OF GRAND UNIFIED GAUGE THEORIES Ph.D. Thesis
Marc Alan Sher 1980 152 p
Avail: Univ. Microfilms Order No. 8021637

The predictions of the simplest grand unified theory (GUT) based on the group SU(5) are examined. Among these are the proton lifetime, the weak mixing angle, and the b-quark mass. It is noted that the most accurate determination of the mixing angle can be made from measurement of the masses of the weak vector bosons (the W and Z). Using higher order expressions for these masses in terms of the mixing angle, the W and Z masses in SU(5) are calculated. By considering the effects of heavy colored scalars on the renormalization group equations, it is shown that the simplest form of SU(5) is the only GUT which makes very precise predictions. If one assumes that the symmetry breakdown in the standard model of electroweak interactions is due to quantum corrections, then the mass of the scalar boson predicted in the model is calculable and is around 10 GeV. The mass is very sensitive to the value of the mixing angle, and its measurement could also be a precise test of SU(5). Also, as this mass is very near the bottomonium (upsilon) states, a precise prediction for the mass could indicate the best method of detection of the scalar. Dissert. Abstr.

N80-33628 Georgia Inst. of Tech., Atlanta.
ANALYTICAL COMPENSATION FOR NEAR-FIELD PROBE POSITIONING ERRORS IN CALCULATED FAR-FIELD ANTENNA PATTERNS Ph.D. Thesis
Larry Edward Corey 1980 245 p
Avail: Univ. Microfilms Order No. 8023761

An analytical technique was to compensate for the effects of the probe positioning errors on far field antenna patterns calculated from measured near field data. For the out of plane errors which cause the near field to be measured on a nonplanar surface, an integral equation relationship was developed between the electric field on the measurement surface and the near electric field on a planar surface. The equation was solved for the planar near field using an iterative technique called the vector projection algorithm. The inplane probe positioning errors caused the near field to be sampled nonuniformly. Uniformly spaced samples were recovered from the measured samples through the solution of a set of linear equations which relate the nonuniform samples of the near field to the Fourier series coefficients of the measured near field. Once the Fourier series coefficients were known, the periodic samples were recovered by the use of the discrete Fourier transform. Dissert. Abstr.

N80-33629 City Univ. of New York, N. Y.
THE EFFECT OF TURBULENCE ON WAVE PROPAGATION IN THE ATMOSPHERE: GENERATION ATTENUATION AND SCATTERING Ph.D. Thesis
Alfred Mendelsohn 1980 138 p
Avail: Univ. Microfilms Order No. 8023750

A comprehensive theoretical study of acoustical wave motion in turbulence is presented. The problems of noise generated by turbulence and that of interaction of acoustical waves with turbulence, resulting in either attenuation or scattering of the wave, are discussed. The spectral structure of sound pressure fluctuations generated by turbulence with strong mean shear is examined. Both the near field noise generated by an infinite turbulent medium and the far field noise generated by a finite volume of turbulence are considered. Dissert. Abstr.

N80-33630 Texas A&M Univ., College Station.
IDENTIFICATIONS AND FORECASTING OF THE POTENTIAL FOR THE OCCURRENCE OF EXTENDED-RANGE VHF-UHF TRANSHORIZON PROPAGATION FROM SYNOPTIC-SCALE DATA Ph.D. Thesis
John Harvin Bradham 1980 103 p
Avail: Univ. Microfilms Order No. 8023015

An objective method is presented for identification of tropospheric areas with a potential for supporting extended range VHF-UHF transhorizon propagation (ERTP), and for forecasting the potential for changes in this structure over short periods of time. Rawinsonde data and sampling interval obtained from the third atmospheric variability experiment (AVE 3) were used in an evaluation of the contribution of sub-synoptic scale processes to variations in the refractive index structure as a function of time, space, air mass, and geography. AVE 3 data also were used in an evaluation of the contribution of the kinematic processes of vertical motion, temperature advection, moisture advection, differential temperature advection, differential moisture advection, and horizontal velocity divergence to temporal and spatial variations of the time rate of change of the vertical gradient of refractivity. An evaluation of the vertical structure of the gradient of refractivity along paths which support ERTP was conducted. Dissert. Abstr.

N80-33631 Arizona State Univ., Tempe.
DIGITAL PHASE MODULATED FIBER OPTICAL COM-

MUNICATION SYSTEM Ph.D. Thesis
Veng Sun Hy 1980 244 p
Avail: Univ. Microfilms Order No. 8023385

An optical fiber system hardware including a laser fiber coupler was constructed to demonstrate experimentally the feasibility of using a minimum shift keyed (MSK) modulation format in a long haul fiber optic system. The MSK modulation format has the following properties: most of its energy is contained in a narrow spectral width, its phase transition is linear. With these two important properties, MSK signal is less affected by the dispersion of the transmission medium than any other common angle modulation scheme. The work done resulted in a feasible laser fiber coupler using lenses, and an intensity modulated optical system with a phase modulated subcarrier. The laser fiber coupler yielded a fairly good result. However, because of its critical alignment problem, this type of coupler is not suitable for field application. The digital phase modulated optical fiber system with a MSK modulation format has proved to be superior than the ON-OFF keyed technique when the subcarrier frequency is below the optical fiber cutoff frequency. Beyond the cutoff frequency of the fiber, the MSK modulation scheme, or the digital phase modulation format, is not suitable for transmissions over a dispersive optical fiber. Dissert. Abstr.

N80-33632 City Univ. of New York, N. Y.
ELEMENTARY PATTERNS FOR LARGE CONFORMAL ARRAYS Ph.D. Thesis
Kang Soo Lee 1980 257 p
Avail: Univ. Microfilms Order No. 8023671

A conformal array is described which has large number of dipole or slot columns circular-symmetrically distributed along the circumference of a conducting cylinder. A dipole or slot column is consisted of an infinite number of array elements in the cylinder axial direction. Because of this three dimensional array geometry, beam scan in elevation as well as in azimuth can be carried out. To investigate the beam scan characteristics of these antenna arrays flush mounted on cylindrical surfaces, the elementary patterns of these arrays are derived. For a conformal dipole array, the separation between the dipole elements and the conducting surface is within a quarter wavelength and the space between them is filled with a dielectric material, the dielectric constant of which is given as epsilon. The special case when epsilon is equal to epsilon sub 0, the dielectric constant of the free space, is also studied. In general, however, the dipole elements can be considered as the printed dipoles on a dielectric board which is clad on a conducting cylinder. For a conformal slow array, the radiating elements are the open waveguides at the surface of a conducting cylinder which is covered with a thin dielectric sheet. Dissert. Abstr.

N80-33633 Northeastern Univ., Boston, Mass.
AN INVESTIGATION OF CONTINUOUS PHASE FREQUENCY SHIFT KEYING AS A MODULATION ON ADDITIVE IMPULSIVE ATMOSPHERIC NOISE CHANNELS Ph.D. Thesis
Thomas Arthur Schonhoff 1980 132 p
Avail: Univ. Microfilms Order No. 8023645

Continuous phase frequency shift keying (CPFSK) was investigated as a potential modulation on Atmospheric Impulsive Noise Channels. Theoretical estimation and Monte Carlo simulation were used to evaluate the error rate performance of CPFSK in terms of E sub b/sigma squared where E sub b per bit sigma squared is the received atmospheric noise variance. The error rate performance was determined for linear receiver as well as non linear receivers consisting of linear receivers preceded by a zero memory nonlinearity, such as a clipper, hole puncher or hard limiter. Both binary and quaternary modulation indices were considered. It was found that the use of CPFSK as a modulation on channels with additive atmospheric noise requires less E sub b/sigma squared achieve a given error rate than was necessary using more conventional modulations such as MSK or CFSK. Dissert. Abstr.

N80-33634 Polytechnic Inst. of New York.
ELASTIC WAVES HEXAGONAL HONEYCOMB Ph.D. Thesis
Sang Keun Park 1980 153 p
Avail: Univ. Microfilms Order No. 8019408

Honeycomb panels were used for the walls of electronic equipment huts and aerospace applications. Panels were inspected for defects in fabrication or during use. Acoustic waves were propagated parallel to the panel. The properties of waves propagating in the honeycomb itself were determined especially in the frequency range where the wavelength is on the order of the cell diameter. The Bloch waves propagating in a honeycomb of infinite extent were examined. At low frequencies the honeycomb was found to act as an elastic continuum. At high frequencies the periodicity and anisotropy of the honeycomb effected the propagation of the Bloch waves, and resulted in the presence of stop bands for propagation in certain directions. Computations of the dispersion curves (frequency dependence), slowness surfaces (direction dependence), and polarization of the Bloch waves were calculated. The propagation characteristics of the waves guided by an aluminum face plate bonded to a honeycomb of semi-infinite extent were found in the low frequency range where the honeycomb acted as an elastic continuum. Dissert. Abstr.

N80-33635 Texas Univ. at Arlington.
DCT/DPCM PROCESSING OF NTSC COMPOSITE VIDEO-SIGNAL Ph.D. Thesis
Avudh Ploysongsang 1980 198 p
Avail: Univ. Microfilms Order No. 8022980

Two different schemes are developed for DCT/DPCM processing of a digital NTSC color composite video signal sampled at three times the color subcarrier frequency. The first scheme is based on applying the discrete cosine transform (DCT) along each horizontal line and then implementing the differential pulse code modulation (DPCM) in the vertical direction on the semitransformed image. The second scheme involves DCT of (4x4) subblocks followed by adaptive DPCM to reduce inter-subblock correlation. Based on the statistics of the error signal, variable word length quantizers, optimized for minimizing the mean square error, are developed. These techniques lead to reduced bit rates for transmitting digital color video at broadcast standards. The effect of noise in the channel is investigated in terms of severity and propagation patterns. This is carried out by using a forced error scheme which selectively forces the error to occur in the different types of coding bits. Error propagation patterns are studied both by computer printouts and by observing the processed images. Dissert. Abstr.

N80-33636 Texas Univ. at Arlington.
INTERFIELD HYBRID CODING OF NTSC COMPONENT VIDEO SIGNALS Ph.D. Thesis
Farhad Ahani Kamanger 1980 231 p
Avail: Univ. Microfilms Order No. 8022983

Interfield hybrid coding of component video signals is investigated. This coding involves two dimensional discrete cosine transform of each field followed by differential pulse code modulation between fields. An efficient algorithm for fast implementation of 2d-DCT is developed. Three different algorithms for 2d-DCT/DPCM system are simulated and analyzed. In the first algorithm optimum quantizers are used in DPCM loops followed by fixed word length coders. Uniform quantizers along with variable word length coders were implemented in the second system. The performance of different deterministic coders are investigated and compared with Huffman coders. The third scheme is an adaptive system. Each block is divided into 4 subblocks. The activity of each subblock is monitored and when it exceeds some threshold the subblock is considered to be spatially active. Dissert. Abstr.

N80-33637 British Library Lending Div., Boston Spa (England).
PULSE CODES FOR THE TRANSMISSION OF BINARY DATA
J. Valin Jan. 1980 44 p refs Transl. into ENGLISH from Revue Technique Thomson-CSF, (Orsay), v. 11, no. 2, Jun. 1979 p 359-401
(BLL-TRANS-3784) Avail: British Library Lending Div., Boston Spa, England

The codes which are used for the transmission of binary data are discussed. These codes may help promote the use of a homogeneous vocabulary for code names. R.K.G.

N80-33638 British Broadcasting Corp., Kingswood (England).
A SET OF TIME VARYING TELEVISION TEST PATTERNS
M. Weston Sep. 1980 15 p refs
(BBC-RD-1980/9) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

The zone plate is now established as a powerful diagnostic tool in the study of television processing systems. The time variable resulting in a family of related patterns which still further increase the usefulness of this approach. These patterns can readily be generated electronically and an indication of the method is given. Author

N80-33639*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CODING FOR SPREAD SPECTRUM PACKET RADIOS
Jim K. Omura 15 Oct. 1980 34 p refs
(Contract NAS7-100)
(NASA-CR-163628; JPL-Pub-80-75) Avail: NTIS HC A03/MF A01 CSCL 17B

Packet radios are often expected to operate in a radio communication network environment where there tends to be man made interference signals. To combat such interference, spread spectrum waveforms are being considered for some applications. The use of convolutional coding with Viterbi decoding to further improve the performance of spread spectrum packet radios is examined. At 0.00001 bit error rates, improvements in performance of 4 db to 5 db can easily be achieved with such coding without any change in data rate nor spread spectrum bandwidth. This coding gain is more dramatic in an interference environment. Author

N80-33640*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SATELLITE COMMUNICATION PERFORMANCE EVALUATION: COMPUTATIONAL TECHNIQUES BASED ON MOMENTS
Jim K. Omura and Marvin K. Simon 15 Sep. 1980 126 p refs
(NASA-CR-163629; JPL-Pub-80-71) Avail: NTIS HC A07/MF A01 CSCL 17B

Computational techniques that efficiently compute bit error probabilities when only moments of the various interference random variables are available are presented. The approach taken is a generalization of the well known Gauss-Quadrature rules used for numerically evaluating single or multiple integrals. In what follows, basic algorithms are developed. Some of its properties and generalizations are shown and its many potential applications are described. Some typical interference scenarios for which the results are particularly applicable include: intentional jamming, adjacent and cochannel interferences; radar pulses (RFI); multipath; and intersymbol interference. While the examples presented stress evaluation of bit error probilities in uncoded digital communication systems, the moment techniques can also be applied to the evaluation of other parameters, such as computational cutoff rate under both normal and mismatched receiver cases in coded systems. Another important application is the determination of the probability distributions of the output of a discrete time dynamical system. This type of model occurs widely in control systems, queueing systems, and synchronization systems (e.g., discrete phase locked loops). Author

N80-33641*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A PARAMETRIC ANALYSIS OF PERFORMANCE CHARACTERISTICS OF SATELLITE-BORNE MULTIPLE-BEAM ANTENNAS
A. B. Salmasi 15 Mar. 1980 99 p refs
(NASA-CR-163632; JPL-Pub-80-52) Avail: NTIS HC A05/MF A01 CSCL 20N

An analytical and empirical model is presented for parametric study of multiple beam antenna frequency reuse capacity and interbeam isolation. Two types of reflector antennas, the axisymmetric parabolic and the offset-parabolic reflectors, are utilized to demonstrate the model. The parameters of the model are introduced and their limitations are discussed in the context of parabolic reflector antennas. The model, however, is not restricted to analysis of reflector antenna performance. Results of the analyses are covered in two tables. The model parameters, objectives, and descriptions are given, multiple-beam antenna frequency reuse capacity and interbeam isolation analysis of the two types of reflectors are discussed as well as future developments of the program model. A.R.H.

N80-33642*# Queensborough Community College, Bayside, N. Y.
INTERCOMMUNICATIONS IN REAL TIME, REDUNDANT, DISTRIBUTED COMPUTER SYSTEM Final Report, Sep. 1979 - Aug. 1980
H. Zanger Aug. 1980 57 p refs Sponsored by NASA
(NASA-CR-163604; JRI-NCA-OR625-001) Avail: NTIS HC A04/MF A01 CSCL 17B

An investigation into the applicability of fiber optic communication techniques to real time avionic control systems, in particular the total automatic flight control system used for the VSTOL aircraft is presented. The system consists of spatially distributed microprocessors. The overall control function is partitioned to yield a unidirectional data flow between the processing elements (PE). System reliability is enhanced by the use of triple redundancy. Some general overall system specifications are listed here to provide the necessary background for the requirements of the communications system. R.K.G.

N80-33643 British Library Lending Div., Boston Spa (England).
RELATIONSHIP BETWEEN SHORT AND LONG TERM RAINFALL RATES AND ITS IMPLICATION FOR THE DESIGN OF RADIO LINKS
Wolfgang Albrecht and Joerg Sander Nov. 1978 10 p refs Transl. into ENGLISH from Frequenz (Berlin), v. 31, no. 11, 1977 p 341-343
(BLL-RDL-Trans-3665-(7737.470)) Avail: British Library Lending Div., Boston Spa, England

Experimentally determined relationships between the mean values of rain intensity measured at one minute and sixty minute intervals are given. These relationships, which were determined in the course of a three year measurement period, are compared with data published by LIN in 1975. The values of attenuation due to rain which were measured on a 12.2 GHz radio link are used to show to what extent design data radio links of this type can be obtained from records of rainfall rates alone. Author

N80-33644# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SYNCHRONIZATION TOLERANCE TO RECEIVING ERRORS IN CODED EM AND PCM SIGNALS TRANSMITTED BY METEOROLOGICAL SATELLITES [SINCRONIZACAO TOLERANTE A ERROS PARA A RECEPCAO DE SINAIS CODIFICADOS EM PCM, TRANSMITIDOS POR SATELITES METEOROLOGICOS]
Valter Rodrigues Jun. 1980 10 p refs In PORTUGUESE; ENGLISH summary
(INPE-1760-RPE/149) Avail: NTIS HC A02/MF A01

The error tolerant synchronization technique was used in the reception of PCM signals that were transmitted by geostationary satellites, and the usual errors probabilities associated with it were 1 part per million. Some algorithms for minimizing the synchronous machines were used to increase the reliability of the circuits and to make equipment cheaper. T.M.

N80-33645# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TELECOMMANDO TRANSMISSION SYSTEM FOR STRATOSPHERIC BALLOONS [SISTEMA DE TRANSMISSAO PARA TELECOMANDO DE BALOES ESTRATOSFERICOS]
Patricio Paul Normandin Sanz and Aydario Barreto Carleial Jul. 1980 15 p refs In PORTUGUESE; ENGLISH summary
Presented at the 32d Reuniao Anual da DPBC, 6-12 Jul. 1980
(INPE-1830-RPE/194) Avail: NTIS HC A02/MF A01

A telecommunication system designed and developed for telecommand of scientific and technological payloads taken on board stratospheric balloons, at the transmission rate of 1200 bit/sec is described. The system takes advantage of parts of a commercially available FM transceiver in 460 MHz. The modulation signal is constructed in Manchester code, from the telecommand bit stream, so as to obtain a spectral composition that is compatible with transceiver's voice passband. Author

N80-33646# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). National Council of Scientific and Technical Research.

GEOMETRY OF AN ANTENNA POSITIONER FOR GEOSTATIONARY SATELLITES [GEOMETRIA DE UM POSICIONADOR DE ANTENA PARA SATELITES GEOESTACIONAROPS]

Carlos E. Santana Jun. 1980 21 p In PORTUGUESE (INPE-1795-NTE/161) Avail: NTIS HC A02/MF A01

The design for a modified equatorial mounting that lends itself to operation with any geostationary satellite is shown. The design incorporates two rotational axes. Imprecision in satellite orbit is compensated for by minor adjustments in the angle of declination. Transl. by S.F.

N80-33647# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

PLATFORM ANTENNAS FOR DATA COLLECTION [ANTENA PARA PLATFORMA DE COLETA DE DEOS]

Benjamin daSilva M. C. Galvao and Carlos E. Santana Jul. 1980 33 p refs in PORTUGUESE; ENGLISH summary Presented at 32d Reunion of the Brazilian Soc. for the Prog. of Sci., Rio de Janeiro, 6-12 Jul. 1980 (INPE-1820-RPE/186) Avail: NTIS HC A03/MF A01

The theoretical development and the design of a quadrifilar helix antenna to be used in platforms for the collection and transmission of environmental data are presented. The chief characteristic of the antenna is its shaped radiation diagram, with a reduced gain in the vertical (axial) pointing direction, in order to compensate for the variation in attenuation due to slant range to a low orbit satellite. Author

N80-33648# Communications Research Centre, Ottawa (Ontario). Communications Systems Branch.

SYNCOMPEX: A VOICE PROCESSING SYSTEM FOR LOW COST HF RADIO TELEPHONY

S. M. Chow and B. D. McLarnon Aug. 1980 11 p refs (CRC-1316-E) Avail: NTIS HC A02/MF A01

Radio signals in the high frequency (HF) band propagate over long distances by reflecting from the ionosphere which is dynamic in nature. This causes signal fading. Syncomplex is a system designed to be used with HF single sideband radio telephone equipment to improve its performance in the presence of interference and fading. It can be used either as an integrated part of a radio design or as a retrofit to existing equipments. The concept is functionally similar to Lincompex but is implemented with modern technology to reduce its cost and to allow its use in conjunction with commercial grade radios. Preliminary evaluation of this system over two HF skywave paths is described. Significant improvements in voice quality and intelligibility were observed during periods of low signal to noise ratio. R.K.G.

N80-33649# Communications Research Centre, Ottawa (Ontario). Space Technology and Applications Branch.

ANIK-B DOC COMMUNICATIONS SYSTEM AND GROUND TERMINALS

J. W. B. Day Aug. 1980 43 p (CRC-TN-704-E) Avail: NTIS HC A03/MF A01

Technical and operational aspects of the 12/14 GHz portion of the ANIK-B satellite are discussed, information to participants in ANIK-B pilot projects to aid in planning. S.F.

N80-33650# American Electronic Labs., Inc., Farmingdale, N. J.

INSTALLATION OF C-6533(XE-2)/ARC ICS IN UH-1H HELICOPTER

J. A. Hnat Jul. 1980 31 p (Contract DAAK80-79-D-0256) (AD-A088708) Avail: NTIS HC A03/MF A01 CSCL 17/2

This report documents the results of the installation of the C-6533(XE-2)/ARC ICS in UH-1H helicopter. Installation was performed at the AEL, Inc., Monmouth County Airport facility. Design of each installation was coordinated and approved by the Government. The mechanical and electrical installation drawings for the helicopter are attached as Appendix A of this report. The new ICS system consisted of new cabling, new intercoms and helmets rewired with new microphones. All four crew stations of the helicopter were reconfigured with the new system. Existing cabling for the standard ICS system remained in the aircraft but was securely stowed for later restoration of the aircraft. The helmets (4) were rewired using separate jacks for headphones and microphone lines. Transmit and receive cables were installed in the aircraft with a minimum separation of one inch between cables. A junction box was fabricated and installed on the aft end of the console to house the fan-out terminal strips. Transmit and receive lines' separation was maintained in the junction box. During the test phase the onboard radios were used with the new ICS system. GRA

N80-33651# Science Applications, Inc., Tucson, Ariz.

ABLE IMAGE CHAIN ANALYSIS. REVISION Final Report

Jerry Zelenka 27 Aug. 1980 90 p Revised (Contract F33659-79-C-0178) (AD-A088853; SAI-TR-04-165-1-Rev) Avail: NTIS HC A05/MF A01 CSCL 17/9

This report seeks to help in establishing Advanced Building Block for Large Area Exploitation system image chain elements, the ABLE data flow, and ABLE interface and test requirements. The document also reviews critical ABLE image chain problem areas, including image sampling requirements, radar image quantization, radar image compression techniques (DPCM, MAPS, etc.), and radar image data display requirements for both hard and soft copy devices. GRA

N80-33652# Naval Ocean Systems Center, San Diego, Calif.

GEOMAGNETIC ACTIVITY AND THE EQUATORIAL SCINTILLATION OF SATELLITE SIGNALS Final Report, Mar. 1978 - Dec. 1979

M. R. Paulson 19 May 1980 62 p refs (RR0320801) (AD-A088848; NOSC/TR-554) Avail: NTIS HC A04/MF A01 CSCL 17/2

Occurrence and intensity of equatorial scintillation have been correlated with daily summed geomagnetic 3 hour Kp indices, through scintillation data from satellites at two elevation angles for UHF and L-band. They also have been correlated with the individual 3 hour Kp indices and the correlations have been shown as a function of the time of day that the magnetic activity occurred. Correlation values as large as -0.91 and -0.56 were observed. A theory of how geomagnetic activity and equatorial scintillation may be connected is proposed. GRA

N80-33653# Army Engineer Topographic Labs., Fort Belvoir, Va.

RADIATIVE TRANSFER IN ONE DIMENSIONAL, DISCRETELY STRATIFIED MEDIA

Eugene A. Margerum Aug. 1980 22 p refs (DA Proj. 4A1-61102-B-52A) (AD-A088885; ETL-0236) Avail: NTIS HC A02/MF A01 CSCL 17/9

The theory of one dimensional radiative transfer is derived for media composed of layers of varying scattering properties. An illuminating interpretation of the formulas is given in terms of the various possible paths of multiple scattering. The semi-infinite homogeneous case is treated by introducing an invariance condition. Then, the transition to the continuous case is made by passage to a mathematical limit. Tabulated diffuse reflection coefficients are given for this last case. GRA

N80-33654# Army Electronics Research and Development Command, White Sands Missile Range, N. Mex.

EVALUATION OF SPECIALIZED PHOTOACOUSTIC ABSORPTION CHAMBERS FOR NEAR MILLIMETER WAVE (NMMW) PROPAGATION MEASUREMENTS

Brian Z. Sojka and Kenneth O. White Aug. 1980 38 p refs (DA Proj. 1T1-61101-A-91A) (AD-A088842; ERADCOM/ASL-TR-0063) Avail: NTIS HC A03/MF A01 CSCL 20/6

Preliminary studies have been conducted to determine the feasibility of using spherical geometry photoacoustic absorption chambers at near millimeter wavelengths (NMMW). New spherical geometry photoacoustic absorption chambers were used in a parallel experimental arrangement to the ongoing (FY 79) NMMW program. Absorption sensitivity, NMMW laser beam handling characteristics, pressure dependence, and temperature effects of the system were evaluated to determine the usefulness and

applicability of these new designs for use at NMMW. Electret microphones were acquired, and testing was done by using these microphones as detectors in specialized spherical geometry and more conventional design photoacoustic absorption chambers. Results from this study show that numerous problems exist in using the spherical geometry photoacoustic absorption chamber design. The combination of resonant frequency temperature dependence, unstable mechanical chopping, high-Q narrow-bandwidth characteristics, and excessive noise sensitivities have limited the absorption sensitivities obtainable. Electret microphone testing and evaluation have led to the design and construction of several conventional, single-pass type, photoacoustic absorption chambers. GRA

N80-33655# Ohio State Univ., Cleveland. ElectroScience Lab.
ON THE APPLICATION OF THE GTD-MM TECHNIQUE AND ITS LIMITATIONS
John N. Sahalos and Gary A. Thiele Griffiss AFB, N.Y. RADC Jul. 1980 38 p refs
(Contract F10628-78-C-0198; AF Proj. 2305)
(AD-A088806; ESL-711353-1; RADC-TR-80-14) Avail: NTIS HC A03/MF A01 CSCL 17/9

In 1975 two techniques were published which combined the method of moments and the geometrical theory of diffraction. One technique extended the moment method through the use of the GTD while the second used the moment method to solve for unknown diffraction coefficients thereby extending the use of the GTD. It is the latter method that is considered in this paper and is referred to as the GTD-MM technique. One problem area that existed with the original GTD-MM work was associated with a field incident along or nearly along one wall of a wedge structure. This paper will show an improved series representation for the diffracted current that is sufficient at all incidence angles. The improved formulation is then applied to the problem of bistatic scattering by a three-sided pyramid. RCS results are obtained which compare very well with experimental measurements. This is believed to be the first use of the GTD-MM technique in treating a 3 dimensional geometry. GRA

N80-33656# Naval Research Lab., Washington, D. C.
ON THE MICROWAVE INTERACTION WITH MATTER AND MICROWAVE BREAKDOWN OF AIR Interim Report
A. W. Ali and T. Coffey 12 Sep. 1980 43 p refs
(AD-A088936; NRL-MR-4320) Avail: NTIS HC A03/MF A01 CSCL 20/3

The interaction of microwave radiation with matter (good conductors and dielectrics) is discussed. Approximate relations are given for the power necessary to vaporize surfaces of these materials. Calculations are also presented for threshold power for air breakdown at microwave frequencies. GRA

N80-33657# Naval Research Lab., Washington, D. C. Satellite Communications Branch.
THE DANGER OF INTERMODULATION GENERATION BY RF CONNECTOR HARDWARE CONTAINING FERROMAGNETIC MATERIALS Final Report
Charles E. Young 7 Jul. 1980 16 p Presented at the 9th Ann. Connector Symp., Cherry Hill, N.J., 20-21 Oct. 1976
(NRL Proj. R08-73)
(AD-A088768; NRL-MR-4233-CH-2) Avail: NTIS HC A02/MF A01 CSCL 09/1

From the few experiments presented here, it should be clear that intermodulation generation (IMG) by ferromagnetic materials (such as stainless steel, nickel plating and hermetic seals) in RF connector hardware is a very serious interference problem to satellite and other sensitive communication systems. Using ferromagnetic materials in RF connectors for military applications is particularly dangerous because of the possible misuse of such devices in IMG vulnerable systems. MIL-C-39012B and related specifications should be revised, prohibiting the use of ferromagnetic materials. Communication centers should be alerted to the potential interference problems of such materials. Their immediate removal is strongly recommended. The necessity to exclude ferromagnetic materials in the fabrication of RF connector hardware, currently an industry-wide problem, cannot be overstressed as a very important step in linearizing RF systems for maximum communication capability. GRA

N80-33658# Naval Research Lab., Washington, D. C.
INTRINSIC SOURCES OF IM GENERATION Final Report
George H. Stauss 7 Jul. 1980 19 p refs
(NRL Proj. R08-73)
(AD-A088771; NRL-MR-4233-CH-5) Avail: NTIS HC A02/MF A01 CSCL 20/3

In addition to avoidable sources of intermodulation signals introduced in manufacture or assembly of a multiplex system, there will be some sources inherent to the materials of which the system is constructed. At some point these sources must provide a lower bound to possible system sensitivity. Such a limitation will only be significant if it is reached before thermal noise becomes dominant. At 20 C and a bandwidth of 2500 Hz, the noise power becomes -140 dBm. It is potentially possible to lower either the temperature or the bandwidth by a factor of about 100, so an ultimate sensitivity limit of about -180 dBm is perhaps significant. Above these levels, a number of intrinsic IM mechanisms can be identified. This chapter constitutes a review of significant intrinsic IM sources. GRA

N80-33659# Michigan Univ., Ann Arbor. Electronics Lab.
THE 1979 TOWED SOURCE EXPERIMENT SIGNAL GENERATOR
K. Metzger, Jr. and L. W. vonWald Dec. 1979 68 p refs
(Contract N00014-75-C-0127)
(AD-A088757; CEL-TM-116.013376-9-M) Avail: NTIS HC A04/MF A01 CSCL 14/2

SGEN79 is the signal generator designed for use in the towed source experiment conducted during June of 1979. The output of this generator can be made up of the sum of as many as six switch selectable waveforms. The amplitude of each waveform can be individually adjusted. The unit provides a quiet period of 20 minutes once every four hours. Clock timing can be derived from an internal oven controlled crystal or from an external 1 to 5 MHz reference. Self-metering capabilities are provided. GRA

N80-33660# Michigan State Univ., East Lansing. Div. of Engineering Research.
RADAR WAVEFORM SYNTHESIS FOR TARGET IDENTIFICATION Final Report, 5 Aug. 1979 - 4 May 1980
Kun-Mu Chen 4 May 1980 51 p refs
(Contract N00019-79-C-0385)
(AD-A088673) Avail: NTIS HC A04/MF A01 CSCL 17/9

A new scheme for radar detection and discrimination, the radar waveform synthesis method, is investigated. This scheme consists of synthesizing the waveform of an incident radar signal which excites the target in such a way that the return radar signal from the target contains only a single natural resonance mode of the target. When the synthesized incident radar signal for a known, preselected target is applied to a wrong target, the return radar signal will be significantly different from that of a natural mode of resonance, thus, the wrong target can be sensitively discriminated. The study on a simple geometry of a thin wire illuminated by a radar signal at normal incidence has been completed. The induced current on the target and the backscattered field from the target are obtained in terms of natural resonance modes. The required waveforms for the incident radar signal for exciting return radar signals which contain various single natural mode of resonance are obtained. When an incident radar signal, which is synthesized to excite a natural resonance mode of a thin wire, is applied to a slightly shorter or longer thin wire, the return radar signal from the wrong target is shown to be significantly different from that of a pure natural mode of resonance. Other studies on the cases of an infinite cylinder, a sphere, and a thin wire under an oblique excitation are in process. GRA

N80-33661# Lincoln Lab., Mass. Inst. of Tech., Lexington.
EFFECT OF DOWNLINK PHASED ARRAY PATTERNS ON SYSTEM AVAILABILITY CONTOUR PREDICTIONS
Y.-L. C. Lo and L. M. Schwab 10 Apr. 1980 63 p refs
(Contract F19628-80-C-0002; AF Proj. 2029)
(AD-A088664; TN-1980-27; ESD-TR-80-70) Avail: NTIS HC A04/MF A01 CSCL 20/14

The relative variation in the pattern function for a 32 element, multibeam EHF satellite phased array has been incorporated into the equation for downlink margin. The corrected margin is used

to determine allowable rain attenuation (dB) and predict link availability based on Crane's 8 region world wide rain rate distribution and climate model. Link availability contours are computed for the cases of a 31 beam and 37 beam phased array. Four equi-spaced geostationary satellites are required for either configuration in order to provide 0.99 (or greater) link availability to all points within the 10 deg. elevation angle field of view for the nominal value of downlink margin and a frequency of 20.7 GHz. GRA

N80-33662# Tel-Aviv Univ. (Israel). School of Engineering.
INTERACTION OF ELECTRONS AND ELECTROMAGNETIC WAVES IN PERIODIC STRUCTURES Final Progress Report, 1 Oct. 1978 - 30 Sep. 1979
Avraham Grover Feb. 1979 76 p refs
(Grant AF-AFOSR-3445-77; AF Proj. 2301)
(AD-A088739; AFOSR-80-0690TR) Avail: NTIS HC A05/MF A01 CSCL 20/5

We have further developed theoretical work on free electron lasers FEL, proposed new mechanisms for FELs, developed numerical computational tools for electron gun design, continued optical experiments, completed the design and initial fabrication of two versions of electron guns, and made appreciable progress in the construction of an experimental set up for spontaneous and stimulated Cerenkov-Smith-Purcell experiments. GRA

N80-33663# American Electronic Labs., Inc., Lansdale, Pa.
SPATIAL PULSE COMPRESSION Final Technical Report, Jul. 1977 - Oct. 1979
Philip Steinbach Mar. 1980 87 p
(Contract F30602-77-C-0136; AF Proj. 0170)
(AD-A084750; RADC-TR-80-43) Avail: NTIS HC A05/MF A01 CSCL 09/5

The characteristics of a broadband antenna which cause it to function as a dispersive filter were verified. A log periodic type antenna with a bandpass from 50 MHz to 1000 MHz was used. To determine the proper waveform a transmitting antenna was driven with a 2 nanosecond impulse and the resulting waveform which was a chirp pulse, was measured at a receiving antenna. A generator was constructed to produce the time inverse of the measured waveform which was driven into the transmitting antenna. The signal at the output of the receiver antenna was measured and observed to be an impulse with processing gain. The antenna range was calibrated using a CW signal of the same amplitude as the transmitted signal. The processing gain of the system is defined as the ratio of the impulse amplitude and was measured at approximately 20 db. For this system, the theoretical gain is approximately 23 db. R.K.G.

N80-33664# SRI International Corp., Menlo Park, Calif.
PROPAGATION MODELING AND EVALUATION OF COMMUNICATION SYSTEM PERFORMANCE IN NUCLEAR ENVIRONMENTS Final Report, 11 Nov. 1976 - 29 Feb. 1980
Charles L. Rino Feb. 1980 43 p refs
(Contract DNA001-77-C-0038)
(AD-A088914; AD-E300890; DNA-5265F) Avail: NTIS HC A03/MF A01 CSCL 20/14

Propagation modeling work for predicting communication system performance in disturbed nuclear environments is discussed. Simple formulas are developed that characterize the onset of scintillation, the coherence time of the scintillation, the coherence bandwidth loss and associated delay jitter, plus the angle of arrival scintillation for radar applications. The calculations are based on a power law phase screen model, and they fully accommodate a varying spectral index and arbitrary propagation angles relative to the principal irregularity axis. In a power law environment, the signal structure is critically dependent upon the power law index, particularly under strong scatter conditions. Author

N80-33665# Lincoln Lab., Mass. Inst. of Tech., Lexington.
OPTIMAL PROPERTIES OF THE CIRCULAR ARRAY FOR USE AS AN ADAPTIVE ANTENNA
Joseph T. Mayhan 17 Apr. 1980 42 p refs
(Contract F19628-80-C-0002)
(AD-A088592; TN-1980-3; ESD-TR-80-27) Avail: NTIS HC A03/MF A01 CSCL 09/5

Thinned array configurations optimized in performance in accordance with specific criteria are developed. These criteria are used to optimize the element positions within the array considering both the close-in nulling resolution, and the average coverage area over a fixed, circular field of view. It is determined that the circular array configuration, with elements equispaced on the circle, generally produces the best close-in nulling resolution against arbitrary interference scenarios for large values of D/lambda. It is shown that exponentially space tapering the elements on the circle improves the average coverage area with little loss in resolution, but leads to element spacings which might be incompatible with finite element size constraints in a practical design. A third array configuration, developed according to standard synthesis techniques for nonuniform arrays, is also considered and shown to lead to good performance. R.K.G.

N80-33666# Range Commanders Council, White Sands Missile Range, N. Mex. Electronic Trajectory Measurement Group.
IRIG STANDARD FOR PULSE REPETITION FREQUENCIES AND REFERENCE OSCILLATOR FREQUENCY FOR C-BAND RADARS Final Report
1980 8 p
(AD-A088545; IRIG-Standard-103-80) Avail: NTIS HC A02/MF A01 CSCL 17/9

Interrange operations make the standardization of radar reference oscillator and operating pulse repetition frequencies a requirement for collecting and mentation radars for target acquisition and/or target handover on interrange operations, they must be reduced and updated by computer to be immediately useful or valid. By applying this standard, many of the data reduction problems which currently exist will be alleviated. Personnel at the various radar complexes adhering to this standard will have the capability of receiving data from one another which is suitable for reduction, updating and immediate utilization. Compliance with the provisions in this standard assures interrange compatibility. R.K.G.

N80-33667# Washington Univ., Seattle. Dept. of Physics.
RADIATIVE CAPTURE STUDIES OF THE ELECTROMAGNETIC DECAYS OF HIGHLY EXCITED STATES
Kurt A. Snover 1980 20 p refs Presented at the Intern. Symp. on Highly Excited States in Nucl. Reactions, Osaka, 12-16 May 1980
(Contract DE-AC06-76ER-01388)
(DOE/ER-01388/443; RLO-1388-443; CONF-800540-2) Avail: NTIS HC A02/MF A01

Selected examples of interesting E1, M1, and E2 resonance studies in (p, gamma) and (alpha, gamma) reactions are discussed. These include a unique determination of E1 amplitudes in the c-12 (p, gamma sub zero)N-13 reaction, E2 strength in light nuclei, M1 decays to the ground states and to the excited sonances in (pi gamma), and M1 gamma decay of stretched particle hole states in O-16 and Si-28. DOE

N80-33668# European Space Agency, Paris (France).
TELEMATICS AND SATELLITES. PART 1: INFORMATION SYSTEMS
W. R. Burke, ed. Jun. 1980 59 p Original contains color illustrations
(ESA-BR-04-Pt-1; ISSN-0250-1589) Avail: NTIS HC A04/MF A01

Telematic systems are identified and described. The applications are examined emphasizing the role played by satellite links. The discussion includes file transfer, examples of distributed processor systems, terminal communication, information retrieval systems, office information systems, electronic preparation and publishing of information, electronic systems for transfer of funds, electronic mail systems, record file transfer characteristics, intra-enterprise networks, and inter-enterprise networks. Author (ESA)

N80-33429*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PATTERN MEASUREMENTS OF A LOW-SIDELOBE HORN ANTENNA
M. A. Janssen, S. Gulkis, S. M. Bednarczyk, H. W. Marlin, and G. F. Smoot (California Univ., Berkeley) *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 8-14 refs (For

primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 20N

N80-33432*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ORION S-BAND DATA ACQUISITION FOR S-Y CALIBRATION
S. C. Wu *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 33-36 ref (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 17I

N80-33434*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DSN GROUND COMMUNICATIONS FACILITY
R. H. Evans *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 40-50 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 17B

N80-33439*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EXPERIMENTAL OPTICAL FIBER COMMUNICATIONS LINK
G. F. Lutes *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 77-85 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 17B

N80-33440*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OPEN-LOOP RADIO SCIENCE WITH A SUPPRESSED-CARRIER SIGNAL
C. A. Greenhall *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 86-97 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 17B

N80-33445*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANETARY RADAR
R. M. Taylor *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 142-144 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 17I

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N80-33669 British Library Lending Div., Boston Spa (England).
INTEGRATED SCREEN PRINTED HYBRID CIRCUITS
G. Hanke 4 Mar. 1980 14 p Transl. into ENGLISH from Fernmelde-Praxis (West Germany), v. 56, no. 10, 1979 p 389-397
(BLL-PO-Trans-3749-(7737.470)) Avail: British Library Lending Div., Boston Spa, England

Different integration techniques are compared and the method of screen printing is described as a suitable technique for making in the laboratory small numbers of samples for testing. The suitability of this method for very fast impulse circuits is demonstrated with reference to a few selected examples which were made under laboratory conditions by the microcircuit technique research groups at the Federal German Post Office.
Author

N80-33670 British Library Lending Div., Boston Spa (England).
WORLD PROGRESS IN ELECTRONIC SWITCHING. PART 2: ANALYSIS OF CURRENT TRENDS
P. Lucas 4 Mar. 1980 51 p refs Transl. into ENGLISH from Ann. des Telecommun. (France), v. 34, no. 1-2, 1979 p 75-91
(BLL-Trans-3756-(7737.470)) Avail: British Library Lending Div., Boston Spa, England

Systems developed in industrialized countries are reviewed and current trends in electronic switching are analyzed. Basic structural principles are defined: stored program control, standardization of languages, digital techniques and integrated networks, information interchange (signalling and data transmission), distribution network, data switching, message switching. Improvements in microelectronics (integrated circuitry and microprocessors) are considered along with architectures, and methods for both networks and systems. Modular design at function level, increased compatibility, and distributed control are discussed including a standardized approach to new services, centralized maintenance facilities, and dynamic network management.
J.M.S.

N80-33671 British Library Lending Div., Boston Spa (England).
THE MECHANICAL PRETREATMENT OF PRINTED CIRCUIT BOARDS
I. Rapp Aug. 1980 17 p Transl. into ENGLISH from Galvanotechnik (Netherlands), v. 70, no. 10S, 1979 p 965-973
(BLL-RTS-12263) Avail: British Library Lending Div., Boston Spa, England

In printed circuit board production a metallically pure surface has to be achieved or failure and rejection are unavoidable. Two kinds of cleaning are distinguished. The first is mechanical cleaning by abrasives. In the wet or the dry process, the wet process being predominant, removal of oxides proceeds at the same time as the surface structure is changed; in most cases roughening of the copper layer takes place. The second kind of cleaning is chemical. This also produces deoxidation and a change of surface structure. Depending on the solution used, the surface is scoured at the same time. Chemical processes (including electrochemical) are more expensive than mechanical processes and should only be weighed in the balance when mechanical processes are inapplicable.
S.F.

N80-33672 British Library Lending Div., Boston Spa (England).
STATE AND TRENDS IN DEVELOPMENT OF THE MANUFACTURE OF PRINTED CIRCUITS
N. Ferenczy Aug. 1980 14 p Transl. into ENGLISH from Galvanotechnik (West Germany), v. 70, no. 10S, 1979 p 946-951
(BLL-RTS-12266) Avail: British Library Lending Div., Boston Spa, England

Manufacturing techniques for printed circuits are examined with a particular emphasis on activation and chemical copper plating, and the various technical possibilities associated with these procedures. The activation methods compared include (1) two-stage activation with ion-generating tin and palladium solutions which are arranged separately in series; (2) palladium-containing activation materials which contain palladium and tin as the reduction material and protective colloid working with a subsequent accelerator; and (3) activation materials which contain palladium, an organic reduction material and organic protective colloids. The conventional immersion rinsing and the spray rinsing techniques for through-hole plating are described and compared.
M.G.

N80-33673 British Library Lending Div., Boston Spa (England).
INFLUENCE OF THE ENVIRONMENTAL CONDITIONS ON A QUARTZ RESONATOR
Michel Valdois May 1978 114 p refs Transl. into ENGLISH of "Influence des Conditions d'Environnement sur un Resonateur a Quartz" Rept. ONERA-TN-225 ONERA, Paris, 1974
(RAE-Lib-Trans-1897(5207); ONERA-TN-225) Avail: British Library Lending Div., Boston Spa, England

Quartz oscillators, used for aerospace applications, are subjected to very severe environmental conditions. Accelerations and vibrations, which can be periodic or random, modify the natural frequency of the resonator and cause frequency instabilities in the oscillator. The quartz resonator was studied as a passive element placed in a transmitting circuit, and installed in an oscillator, which is its normal condition of usage. The accelerations to which the resonators were subjected were steady state,

sinusoidal or random. The orientation of the acceleration relative to the quartz crystallographic axis, as well as its direction, are of prime importance. The same tests were performed on oscillators containing the resonators previously studied. The results confirm the part played by the resonator in the degradation of the stability of a quartz oscillator subjected to external disturbances. A.R.H.

N80-33674 Utah State Univ., Logan.
TWO TESTS OF ELECTRIC FIELDS, SECOND-ORDER IN SOURCE-VELOCITY TERMS OF CLOSED STEADY CURRENTS. 1: AN ELECTRON BEAM. 2: A SUPERCONDUCTING COIL Ph.D. Thesis
Christopher Scott Kenyon 1980 155 p
Avail: Univ. Microfilms Order No. 8019254

The results of two experiments designed to test for second order, source velocity electric fields from steady, closed currents were analyzed. The first experiment employed an electron beam. The second used a niobium-titanium coil designed so that the voltage measurement configuration could be easily switched from a Faraday to a non-faraday configuration between sets of runs. The implications of the observation of a null charge on magnetically suspended superconducting spheres vis-a-vis the second order, source velocity fields were also examined. Dissert. Abstr.

N80-33675 California Univ., San Diego.
SUPERCONDUCTIVITY, MAGNETISM AND STRUCTURAL STUDY OF SOME NEW TERNARY TRANSITION METAL BORIDES Ph.D. Thesis
Huan-Chiu Ku 1980 131 p
Avail: Univ. Microfilms Order No. 8023103

Superconductivity has been found in the rare earth iridium borides. The compounds were found to crystallize with the primitive tetragonal CeCo4B4-type structure and the pure phase in itself is only metastable at best. The close correlation between superconductivity, magnetism and structural metastability is demonstrated. The boundaries between the paramagnetic, superconducting and magnetically ordered phases in the Ho(Ir(x)Rh(1-x))4B4 system have been established by means of magnetic susceptibility measurements down to 1.2 K. Antiferromagnetic ordering occurs for x = 0.6 with Neel temperatures higher than the superconducting transition temperatures, showing an aspect of the coexistence of magnetic order and superconductivity. The boundaries between the paramagnetic, superconducting and magnetically ordered phases in the Dy(Ir(x)Rh(1-x))4B4 also were established. The occurrence of superconductivity with an onset of 7.2 K is reported for the metastable ScRu4B4 compound. Two ternary boride systems with the new LuRuB2-type structure are reported. Superconductivity as high as 10.0 K is found for the LuRuB2 compound. Dissert. Abstr.

N80-33676 Princeton Univ., N. J.
STUDY OF HIGH FIELD EFFECTS IN METAL-ALUMINUM OXIDE-SILICON CAPACITORS Ph.D. Thesis
Ori Bar-Gadda 1980 109 p
Avail: Univ. Microfilms Order No. 8023816

The mechanisms which control the voltage instability and the breakdown of chemically vapor deposited Al2O3 on Si substrates were investigated. The samples were metal Al2O3 Si capacitors with both Al and Au field plates. Electron injection and trapping, with resultant positive flatband voltage shift occurred at fields as low as 1-2 MV/cm. An approximate method for computing the location of the centroid of the trapped electrons was developed. Results indicate that the electrons are trapped near the injecting interface, at least for fields less than about 5 MV/cm. Dissert. Abstr.

N80-33677 Georgia Inst. of Tech., Atlanta
FREQUENCY SKIPPING IN NEGATIVE RESISTANCE OSCILLATORS WITH APPLICATIONS TO CRYSTAL-CONTROLLED MONOLITHIC PHASE-LOCKED LOOPS Ph.D. Thesis
Stephen Scott Walker 1980 233 p
Avail: Univ. Microfilms Order No. 8023768

The problem of frequency skipping, or forced mode changes, is examined in two types of quasilinear multimode oscillators with current controlled negative resistance characteristics. The two oscillators investigated are the van der Pol oscillator and the emitter coupled astable multivibrator (ECAM). The method of Kryloff and Bogoliuboff is used as the mathematical foundation for the analysis. The validity of the ECAM model and the associated predicted skipping behavior are experimentally verified for a specific monolithic oscillator resonating under quartz crystal control. Laboratory results are presented and discussed for a series of transient and steady state measurements involving test crystals with fundamental resonant frequencies between one and ten megahertz. Finally, the frequency skipping analysis is extended to ECAM applications in crystal controlled monolithic phase locked loops (PLLs). The source of the skip stimulus and the necessary and sufficient conditions for producing skips in such a system are identified and experimentally confirmed. A technique for controlling and eliminating the phenomenon is presented. Dissert. Abstr.

N80-33678 Case Western Reserve Univ., Cleveland, Ohio.
CHARACTERIZATION AND THEORY OF ELECTROLYTE-INSULATOR-SEMICONDUCTOR FIELD-EFFECT TRANSISTOR Ph.D. Thesis
Clifford Der-Jau Fung 1980 144 p
Avail: Univ. Microfilms Order No. 8021687

Fabrication characterization and theoretical modeling of a semiconductor chemical sensor, referred to as an electrolyte insulator semiconductor field effect transistor (EISFET), are presented. A model describing the surface ionization and complexation of the surface hydroxyl groups on the insulator film was adapted to obtain the charge and potential distributions as the electrolyte insulator semiconductor interfaces of an EISFET. A theoretical model for the EISFET was developed based on an integral approach which links the electrochemical phenomena occurring at the insulator electrolyte interface to a surface conduction channel on the semiconductor through the field effect. The results of the devices in simple electrolytes are found to be consistent with the theory suggesting the validity of the model. It is concluded that the surface site density, N sub s, and the separation of surface ionization constants, expressed in terms of pK, are the main controlling factors for the performance of the EISFET as a pH sensor. Dissert. Abstr.

N80-33679*# National Aeronautics and Space Administration. Pasadena Office, Calif.
CONTROL MEANS FOR A SOLID STATE CROSSBAR SWITCH Patent Application
Tage O. Anderson, inventor (to NASA) (JPL) Filed 29 Sep. 1980 20 p
(Contract NAS7-100)
(NASA-Case-NPO-15066-1; US-Patent-Appl-SN-191744) Avail: NTIS HC A02/MF A01 CSCL 09C

A control system for a solid state crossbar switch is described which allows a number of switch control and interrogation functions to be implemented by time sharing related circuitry. The crossbar switch includes a number of X ports and Y ports. Each X-Y port intersection designates a specific X-Y intersection latch which controls a number of associated switches for interconnecting one set of data lines associated with the X port to another set of data lines associated with the Y port. The control system continuously and sequentially addresses each of the X-Y intersection latches at a 10 megahertz rate. During this continual and sequential addressing, the control circuitry includes a capability for (1) interrogating each intersection latch for determining which are in a set condition; (2) ensuring that only one X-Y intersection latch is set on an X row and Y column defining that latch; (3) resetting all of the X-Y intersection latches; and (4) determining which of the X-Y intersection latches are in a set condition. NASA

N80-33680# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). National Council for Scientific and Technical Research.
FILTER PROJECT WITH A PLANAR CIRCUIT IN THE WAVEGUIDE [PROJETO DE FILTROS COM CIRCUITO PLANAR EM GUIA DE ONDAS]
Eduardo A. Parada Tude and Carlos E. Santana Jul. 1980 21 p refs In PORTUGUESE; ENGLISH summary
(INPE-1817-RPE/185) Avail: NTIS HC A02/MF A01

A planar circuit mounted in a waveguide is a metal sheet parallel to the E plane, inserted in the middle of a waveguide. This circuit has low losses and is adequate for microwave circuits.

Prototypes of the filters, in the X band, present insertion losses better than 1dB. S.F.

N80-33681# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CONTROL OF THE RECOMBINATION TIME IN PHOTOCONDUCTIVE DETECTORS [CONTROLE DO TEMPO DE RECOMBINACAO EM DETETORES FOTOCONDUTORES]
Marcos Tadeu T. Pacheco, Cesar C. Ghizoni, and Sergio Luiz Scolari Jul. 1980 11 p refs In PORTUGUESE; ENGLISH summary Presented at the 32d SBPC
(INPE-1814-RPE/182) Avail: NTIS HC A02/MF A01

The current generated at a photoconductive cell depends upon the density of states of the electromagnetic field in the semiconductor film. This density of states is a function of the film geometry and dielectric properties. In this work we demonstrate that, for highly scattering substrate surfaces, which implies in a low density of states, the signal to noise ratio is better than that for smooth surfaces. Author

N80-33682# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
IMPACT OSCILLATOR WAVEGUIDES [OSCILADOR IMPATT EM GUIA DE ONDAS]
Paulo Mello Marshall and Carlos Eduardo Santana Jul. 1980 25 p refs Presented at the 32d Reuniao da SBPC, 6-12 Jul. 1980
(INPE-1816-RPE/184) Avail: NTIS HC A02/MF A01

The theoretical analysis and the construction details of an X-band waveguide IMPATT oscillator are presented. The mounting configuration used consisted of a cylindrical post supporting the diode. Using the parameters specified for the active device and those of the T-equivalent circuit of the post, the oscillation conditions were analyzed by a computer. Measurements of the oscillation frequency and tuning band on an experimental oscillator, constructed according to the calculation method described, show good agreement with the calculations. T.M.

N80-33683*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPARATIVE PERFORMANCE OF HgCdTe PHOTODIODES FOR HETERODYNE APPLICATION
Herbert R. Kowitz Oct. 1980 15 p refs Presented at the Heterodyne Systems and Technol. Conf., Williamsburg, Va., 25-27 Mar. 1980
(NASA-TP-1745; L-14019) Avail: NTIS HC A02/MF A01 CSCL 09C

Photodiodes used as photomixers in heterodyne applications display quantum efficiencies that are lower than the dc quantum efficiency of the device. Measurement techniques used to obtain dc quantum efficiencies, midband heterodyne quantum efficiencies, and frequency roll off characteristics are described. Measurement results for two HgCdTe photodiodes are given and discussed. It is recommended that photodiodes used in heterodyne applications be tested for heterodyne quantum efficiency over the frequency band of interest for the particular application. Author

N80-33684# Naval Ship Research and Development Center, Bethesda, Md. Computation Mathematics/Logistics Dept.
POWER LOSSES IN LIQUID METAL CURRENT COLLECTORS Final Report, Oct. 1978 - Mar. 1980
Myles M. Hurwitz and Dolores R. Wallace May 1980 27 p
(AD-A086527; DTNSRDC/CMLD-80/10) Avail: NTIS HC A03/MF A01 CSCL 20/3

A numerical capability has been developed which will compute ohmic and viscous power losses in liquid metal current collectors. The present work extends previous analytical investigations in that semi-infinite collector geometries are no longer assumed. This new capability is based on the finite element method and makes use of electrical current densities computed by the heat transfer portion of the NASTRAN structural analysis program. Although some limitations and questions remain, a comparison between the new numerical capability and experiment shows very good agreement in the computation of the power losses. GRA

N80-33685# Electromagnetic Systems Labs., Inc., Sunnyvale, Calif.
CPSK, DPSK, AND FSK DEMODULATOR PERFORMANCE UNDER NUCLEAR STRESSED CONDITIONS Final Report, 21 Feb. 1978 - 31 Mar. 1979
Ronald Ibaraki, Randy Heckman, Laurence Kearney, and James Marshall 31 Mar. 1979 106 p
(Contract DNA001-78-C-0169)
(AD-A088364; AD-E300878; ESL-TM-1083; DNA-5006F) Avail: NTIS HC A06/MF A01 CSCL 09/5

The relative performance of satellite communication links using conventional binary CPSK, DPSK, and noncoherent FSK demodulation techniques is evaluated for a range of simulated highly ionized and striation regions which may result following high altitude nuclear detonations. Performance is characterized by bit error rate estimates obtained through extensive computer simulation of satellite downlinks using various modem designs over a range of data rates and fade rates. Phase fluctuations are shown to be an increasingly dominant performance degrading factor as fade rates increase. The interrelated effect on performance of the fade rate, data rate, carrier removal circuit noise bandwidth, and bit energy-to-noise ratio is examined in detail and a number of performance scaling relationships among these parameters is identified which allows the extensive simulated results obtained here to be generalized to similar modems operating at other data rates and fade rates. GRA

N80-33686# Naval Research Lab., Washington, D. C. Satellite Communications Branch.
CONNECTOR DESIGN TECHNIQUES TO AVOID RFI Final Report
Charles E. Young 7 Jul. 1980 13 p refs Presented at the 11th Ann. Connector Symp., Cherry Hill, N.J., 25-26 Oct. 1978
(NRL Proj. R08-73)
(AD-A088769; NRL-MR-4233-CH-3) Avail: NTIS HC A02/MF A01 CSCL 09/1

A paper, presented at the Ninth Connector Symposium, gave detailed experimental evidence of the serious RFI levels produced by commonly available RF connectors which use ferromagnetic materials (iron, nickel, cobalt or their alloys) for electrical conductors. For example, the body structure of a wide variety of precision made coaxial connectors and adapters are currently manufactured only from stainless steel, type 303, a ferromagnetic alloy. To cut cost and provide a corrosion resistant finish, nickel plating, another ferromagnetic material, has been almost exclusively substituted for silver or gold, previously employed to plate brass stock connectors. That such materials could be considered for electrical conductor service is difficult to understand because of the known nonlinear effects of even minute quantities of ferromagnetic contaminants in RF systems. Use of ferromagnetic materials, however, has become so widespread that silver or gold plated brass (nonferromagnetic) devices, which had been standard for many years, are no longer readily available as 'off-the-shelf' items but must be specially ordered in quantities (500 or more) to obtain reasonable production cost. Connectors fabricated from ferromagnetic materials typically produce IMG power levels 3 to 5 orders (1000 to 100,00 times) higher (worse) than without. Obviously such interference levels cannot be tolerated in today's highly sensitive communication systems. The ferromagnetic connector RFI problem came to light in 1975 during the Naval Research Laboratory's investigation of passive component nonlinearity and means for its reduction required by the Fleet Satellite Communications (FLTSATCOM) system, then under development. GRA

N80-33687# Naval Research Lab., Washington, D. C. Microwave Technology Branch.
COMPUTER-AIDED ANALYSIS FOR THE DESIGN OF BROAD CLASSES OF MICROWAVE COUPLERS, FILTERS, AND TRANSMISSION LINES Interim Report
B. E. Spielman 24 Mar. 1980 11 p refs
(RR0210346)
(AD-A088772; NRL-8394) Avail: NTIS HC A02/MF A01 CSCL 09/1

The use of a flexible, computer-aided analysis for designing broad classes of microwave couplers, filters, and transmission lines is described. The convergence characteristics are illustrated for computations of impedance and phase velocity of an isolated microstrip line. Design curves are presented for a coupler configuration employing microstrip over a slotted ground plane.

Experimentally determined performance characteristics are presented for a directional coupler designed using these computer generated design curves. GRA

N80-33688# Stanford Univ., Calif. Edward L. Ginzton Lab.
MICROWAVE TUBES Final Scientific Report, 1 Jun. 1977 - 30 Sep. 1978
Marvin Chodorow 2 Jun. 1980 99 p refs
(Grant AF-AFOSR-3351-77)
(AD-A088745; GL-3131; AFOSR-80-0092TR) Avail: NTIS HC A05/MF A01 CSCL 09/1

The intent of this report is to describe in some technical detail the various kinds of microwave tubes, either now in use or projected, discuss their modes of operation, present characteristics, limitations and applications, and also to discuss in terms of their technical characteristics what may be anticipated for possible performance and/or applications of these various tube types. Since this report is intended for a range of readers of varying degrees of knowledge in the field, it will be organized in a fashion so that it will be possible to read and get information at various levels of detail and sophistication. Various separate sections which can be read independent of the main text provide further details of characteristics of the various tube types for those who might be interested. It is not intended, however, that any portion of this report would be suitable in itself for tube designers, and there will be categorical statements about results, methods, without necessarily giving derivations or all the logical connections between some of the statements. In many cases, plausibility will be used rather than detailed, logical arguments to prove the validity of particular technical evaluations. We list first the various types of tubes which will be considered, with broad descriptions of their particular characteristics and possible applications. This will be followed by sections on each tube type, describing the tube in more detail. The tubes that will be described are the klystrons, the travelling wave tube, crossed field devices, (magnetion, crossed field amplifier, etc.), the gyrotron (also known as the cyclotron maser), the ubitron (also known as the free electron laser), and the gyrocon. GRA

N80-33689# Brown Univ., Providence, R. I. Div. of Applied Mathematics.
DIFFUSION APPROXIMATIONS FOR THE ANALYSIS OF DIGITAL PHASE LOCKED LOOPS
Harold J. Kushner and Hai Huang May 1980 31 p refs
(Contract N00014-76-C-0279; Grants AF-AFOSR-3063-76; NSF ENG-77-12946)
(AD-A088703) Avail: NTIS HC A03/MF A01 CSCL 09/5

Recent results for getting diffusion limits of a sequence of suitably scaled stochastic processes are applied to the synchronization problem for a digital phase locked loop (DPLL). The discrete time parameter error processes is suitably amplitude scaled and interpolated into a continuous time parameter process. For small filter gains and symbol intervals, a diffusion process approximation is rigorously obtained. This approximation is a Gauss-Markov process and it yields approximate error variances, passage time distributions, correlation properties, (among other properties) for the DPLL. The tracking problem when the clock drifts is also treated. The technique is applicable to a wide variety of related problems, to get continuous time Markov systems which are easier to analyze the original (continuous or discrete time) systems which they approximate. GRA

N80-33690# Kentucky Univ., Lexington. Dept. of Electrical Engineering.
SYNTHESIS METHODS APPLICABLE TO SEM POLE PAIR ADMITTANCES
Krzysztof A. Michalski and L. Wilson Pearson Dec. 1979 123 p
(AD-A088923; RR-79-5) Avail: NTIS HC A06/MF A01 CSCL 09/3

The applicability of the first layer conjugate pole pair at a time equivalent circuit synthesis for energy collecting structures is considered. It is found that, at least for some highly resonant structures, the whole eigenset of poles can be approximately represented by the first layer dominant pole. The driving point admittance function can then be synthesized in the form of a parallel connection of simple pole-pair modules. The biquadratic functions corresponding to each conjugate pole pair are, in general, not positive real and thus physically realizable. The explicit form of this network, as well as Brune and Darlington network, is derived. It is demonstrated that the Darlington network reduces to Brune network or, if surplus factors are used, to Bott-Duffin network. The Miyata procedure is not applicable to minimum biquadratics. After further approximation the Bott-Duffin network can be reduced to simple four element structure which has been shown to give favorable results for the thin wire dipole and loop antennas. It is demonstrated that the equivalent networks derived are very sensitive to changes in element values. This and the influence of the parasitic effects associated with real circuit elements can unfavorably affect the practicability of the derived networks, should they be constructed. GRA

N80-33691# Human Engineering Labs., Aberdeen Proving Ground, Md.
USERS MANUAL FOR THE TRANSPARENT TOUCH SENSITIVE CATHODE RAY TUBE DISPLAY OVERLAY Final Report
Michael W. Thompson Jul. 1980 17 p
(AD-A088939; HEL-TN-8-80) Avail: NTIS HC A02/MF A01 CSCL 09/1

This manual provides the operational and programming information for using the Elographics Touch Sensor on the Varian 620 computer. The touch sensor is a transparent pressure sensitive panel that overlays a graphics display system CRT. The touch sensor also consists of a Touch Sensor Controller and an Interface Controller for configuring the touch sensor to the Varian 620 computer. Programming is accomplished using the Varian DAS assembly language. GRA

N80-33692# Harry Diamond Labs., Adelphi, Md.
RESEARCH STUDY ON NEAR MILLIMETER WAVE ORO-TRONS
Donald E. Wortman and Richard P. Leavitt Jul. 1980 37 p refs
(DA Proj. 1L1-61102-AH-44)
(AD-A089097; HDL-SR-80-4) Avail: NTIS HC A03/MF A01 CSCL 09/1

An extensive literature search has been performed in technological areas related to the development of orotrons (electron-beam/open-resonator radiation sources) in the Soviet Union. Orotrons have been found to be practical, tunable, efficient, and lightweight sources of near millimeter wave radiation; our calculations have confirmed some of the conclusions obtained from the Soviet literature. No work on orotrons performed in the U.S. has been found. In work reported from the Soviet Union, power outputs of several watts have been obtained at wavelengths from 4 to 1 mm, with electron-beam voltages of 1 to 5 kV and currents up to a few hundred milliamperes. GRA

N80-33693# State Univ. of New York at Buffalo. Dept. of Chemistry.
DIFFUSION CONTROLLED CURRENT AT A STATIONARY FINITE DISK ELECTRODE. EXPERIMENT
Koichi Aoki and Janet Osteryoung Aug. 1980 24 p refs
Submitted for publication
(Contract N00014-79-C-0644)
(AD-A089063; TR-1) Avail: NTIS HC A02/MF A01 CSCL 07/4

Micro disk electrodes were constructed from glassy carbon electrodes coated with photo resist by using conventional photolithography. Chronoamperometric measurements were made at these electrodes in the system ferrocyanide/ferricyanide. Dependence of currents on time and on radii of the electrodes was in good agreement with that predicted by the theory presented previously. GRA

N80-33694# Naval Research Lab., Washington, D. C.
VECTOR-POTENTIAL FLOW IN RELATIVISTIC BEAM DIODES Interim Report
D. P. Bacon, S. A. Goldstein, R. Lee, and G. Copperstein Sep. 1980 38 p refs
(AD-A089135; NRL-MR-4326) Avail: NTIS HC A03/MF A01 CSCL 09/1

Analytic theory, numerical simulations and experiments indicate that a combination of a bias current pinch and an ion induced pinch may allow the efficient pinching of electron beams

generated in large aspect ratio diodes. In the new diode geometry, electrons flow radially inward along vector-potential field lines which lie close to the anode. As these electrons do not touch the anode, there is no plasma formation and consequent loss of energy to accelerated ions. Entering a region close to the axis in which an anode plasma does exist, these electrons undergo an ion induced pinch to still smaller radii. Since the bulk of the flow occurs along vector-potential field lines, we have coined this new diode the Paravector-potential diode. GRA

N80-33695# Varian Associates, Palo Alto, Calif. Microwave Tube Div.
HIGH POWER MILLIMETER WAVE AMPLIFIER Final Report, Oct. 1977 - Oct. 1979
P. Ferguson, S. Hadji, Howard Jory, A. Nordquist, and R. Symons Apr. 1980 90 p refs
(Contract F30602-78-C-0011; ARPA Order 3192)
(AD-A088591; RADC-TR-80-132) Avail: NTIS HC A05/MF A01 CSCL 09/1

A high power 94 GHz amplifier based on the Gyrotron or cyclotron resonance interaction was developed. Ultimate goals are 10 kW peak power, 10 kW average power, at least 4 percent bandwidth, 30 percent efficiency and 40 kB power gain. The experimental work was performed at C band (5.0 GHz). The testing of the 3 cavity Gyroklystron developed is described. A description including test results of the 5 GHz Gyro-TWT is given. Operating the Gyro-TWT at 60 kV beam voltage at 5 amperes beam current yielded 50 kW output power with 18 dB saturated gain at 6 percent bandwidth and 16.6 percent efficiency. An alternate technique for producing an electron beam with a ratio of 1.5 was also investigated. This technique includes the utilization of a Pierce type electron gun to give a solid beam (as opposed to the hollow beam produced by the conventional magnetron gun) followed by a bifilar helix of established length. R.K.G.

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N80-33696 California Univ., Los Angeles.
DROPLET EVAPORATION IN HIGH TEMPERATURE ENVIRONMENTS Ph.D. Thesis
George Manchester Harpole 1980 140 p
Avail: Univ. Microfilms Order No. 8023318

Water droplet heat and mass transfer were determined numerically and experimentally for the case of high temperature environments. Radiative absorption was computed by ray tracing including polarization, refraction, external reflection, and multiple internal reflections. A modified Snell's law with real angles was used so that volumetric heating was computed as a function of radial position. For water droplet diameters on the order of 1 mm, the absorption of thermal radiation is largely confined to a thin layer near the droplet surface, the effective absorptance values are about 90 percent, and the reflectance is about 7 percent. For high black body radiating temperatures and for small droplets, the absorptance is smaller. The effects on droplet convective heat transfer of (1) blowing due to evaporation, (2) variable fluid properties, and (3) binary diffusion with nonequal heat capacities were estimated numerically with stagnation point solutions. Dissert. Abstr.

N80-33697 British Library Lending Div., Boston Spa (England).
THE THEORY OF TWO DIMENSIONAL SEPARATED FLOWS
L. V. Gogish, V. Yu. Neiland, and G. Yu. Steppnov 4 Mar. 1980 74 p refs Transl. into ENGLISH from Gidromekhanika (Moscow), v. 8, 1975 p 5-73
(RAE-LIB-Trans-2002) Avail: British Library Lending Div., Boston Spa, England

The theory of separated flow relates to those motions of real fluids which occur most frequently and are at the same time the most difficult to investigate. Basic models of separated flow around bodies are given and numerical solutions of the Navier-Stokes equations for separated flows are discussed. The asymptotic solution of the Navier-Stokes equation in the theory of separated flows and approximation methods of calculating separated flow are also presented. E.D.K.

N80-33698 Ohio State Univ., Columbus.
ANALYTICAL AND NUMERICAL SOLUTIONS FOR MASS DIFFUSION IN A COMPOSITE CYLINDRICAL BODY Ph.D. Thesis
Ajit Kumar 1980 153 p
Avail: Univ. Microfilms Order No. 8022302

The analytical and numerical solution techniques were investigated to study moisture diffusion problems in cylindrical bodies that are assumed to be composed of a finite number of layers of different materials. A generalized diffusion model for an n-layer cylindrical body with discontinuous moisture content at the interfaces was developed and the formal solutions were obtained. The model is to be used for describing mass transfer rates of any composite body, such as an ear of corn which could be assumed of consisting two different layers: the inner core represents the woody cob and the outer cylinder represents the kernel layer. Data describing the fully exposed drying characteristics of ear corn at high air velocity were obtained under different drying conditions. Ear corns were modeled as homogeneous bodies since composite model did not improve the fit substantially. A computer program using multidimensional optimization technique showed that diffusivity was an exponential function of moisture content and an arrhenius function of temperature of drying air. Dissert. Abstr.

N80-33699 Cincinnati Univ., Ohio.
STUDY OF LAMINAR AND TURBULENT FLOW IN DUCTS OF POLAR CROSS-SECTION Ph.D. Thesis
Ramesh Kumar Goyal 1980 224 p
Avail: Univ. Microfilms Order No. 8021079

The viscous incompressible flow in curved ducts of some regular cross sections was analyzed for laminar as well as turbulent flow configurations. Rectangular, circular as well as polar cross sections were considered. The mathematical model is formulated using the time averaged three dimensional parabolized Navier-Stokes equations in a surface oriented toroidal coordinate system. An appropriate discretized representation is derived for the Poisson operator in analytically transformed coordinates in order to obtain efficient solutions of the Neumann boundary value problems encountered in the analysis. For turbulent flow configurations, turbulence closure is achieved by a two equation turbulence model employing the turbulent kinetic energy and its dissipation rate, which in turn yield the turbulent eddy viscosity. The Neumann boundary value problems encountered for the cross plane pressure distribution and for a velocity potential, introduced in order to satisfy local mass conservation, are solved by the successive over-relaxation method. Dissert. Abstr.

N80-33700 Rutgers - The State Univ., Piscataway, N. J.
NUMERICAL STUDIES OF DISPERSION PROCESSES IN TWO DIMENSIONAL, HOMOGENEOUS, DECAYING TURBULENCE Ph.D. Thesis
Anthony Daniel Kowalski 1980 137 p
Avail: Univ. Microfilms Order No. 8022568

Lagrangian statistical results are presented from numerical simulations of an ensemble of 1,024 fluid particles which were generated from a two dimensional, turbulent Eulerian field. A 128 x 128 Eulerian field simulation was run in preparation for a larger scale 512 x 512 simulation which was capable of supporting an extended enstrophy cascade region in the energy spectrum. The measured single particle statistics include the mean square single particle displacement vs. time, Lagrangian temporal velocity correlations, integral length scale, mean square single particle velocity, and probability distribution of single particle displacements. The single particle results are comparable to previous measurements performed on a 64 x 64 grid and are used for qualitative comparison to the measured two particle relative statistics. The short and long time limiting behavior of the mean square single particle displacement are also analyzed

and compared to the theoretical predicted power law behavior.
Dissert. Abstr.

N80-33701 California Univ., San Diego, La Jolla.
VISCOUS FLOW NEAR A SPHERE UNDER SURFACE GRAVITY WAVES Ph.D. Thesis
Scott Alan Jenkins 1980 176 p
Avail: Univ. Microfilms Order No. 8023099

The motion of a viscous fluid about a sphere submerged to mid depth under long, monochromatic surface gravity waves is calculated for small values of a second order type Reynolds number. The solution by matched asymptotic expansions uses the fundamental irrotational wave oscillation to drive a thin Stokes ac boundary layer over the surface of the sphere. From the boundary layer several secondary motions are excited which die away in the neighboring fluid. Among these are a system of steady, rotational Eulerian drift currents, and two outwardly radiating, irrotational acoustic waves, one having the frequency of the fundamental but with a phase shift, the other appearing at the second harmonic. With this solution the forces and torques on a fixed sphere were computed. A rotary lift force was found to oppose the virtual mass forces and thereby diminish the wave force component in quadrature to the wave profile. Steady and second harmonic torques were found to act on the sphere about its horizontal transverse axis. These results were compared to laboratory observations. Dissert. Abstr.

N80-33702 Georgia Inst. of Tech., Atlanta.
ENHANCEMENT OF THERMAL ENERGY TRANSPORT THROUGH GRANULAR MEDIA Ph.D. Thesis
Kenneth Wade Jackson 1980 239 p
Avail: Univ. Microfilms Order No. 8023764

Means of increasing the transport of heat through granular media are studied. Practical application includes design and development of thermal backfill materials for improving the heat transfer between the Earth and underground heat sources such as buried electric power cables and ground source heat pump coils. A unit cell model is used to predict the effective thermal conductivity of a granular medium composed of sand particles, a thermal binder, and air. A method based upon the concepts and theory of quantitative stereology was developed which links the macroscopic properties of the medium to the microstructural measurement of contiguity. The predictive accuracy of the unit cell model for sand-like media was verified with numerous thermal conductivity data obtained with the transient, cylindrical probe technique. Thermally coupling contiguous sand particles with a composite binder comprised of micron-sized inorganic particles mixed with an organic adhesive can increase the effective thermal conductivity of dry sand by as much as a factor of ten.
Dissert. Abstr.

N80-33703 Arizona State Univ., Tempe.
LAMINAR FILM FLOW PHENOMENA-THEORY AND APPLICATION TO THE TWO-PHASE CLOSED THERMOSYPHON Ph.D. Thesis
Robert Ivan Hirshburg 1980 344 p
Avail: Univ. Microfilms Order No. 8023382

The hydrodynamic and thermal characteristics of thin, laminar wavy-film flow are considered. A theoretical model is developed to predict the hydrodynamic features of asymptotic wavy-flow states. The mathematical closure question arising in asymptotic-state analysis satisfactorily resolved. The model accurately predicts published experimental data for mean film thickness, trough-to-crest dimension, wave clerity, and wavelength. The Nusselt theory for laminar film condensation is shown to significantly underpredict existing experimental data due to the presence of waves on the condensate film surface. Consequently, a heat transfer model is developed incorporating the wave-film hydrodynamic model results. The subsequent predictions agree well with experimental data and, in addition, indicate the appropriate data trend with flow length. Other thin-film phenomena are described, including continuous-film breakdown, rivulet flow, and sputtering. All of these phenomena are present in the operation of a heat-transfer device known as the two-phase closed thermosyphon. Accordingly, this device is experimentally investigated. Dissert. Abstr.

N80-33704 Columbia Univ., New York.
THE USE OF SOURCES AND SINKS IN SOLVING TWO-DIMENSIONAL HEAT CONDUCTION PROBLEMS WITH CHANGE OF PHASE IN ARBITRARY DOMAINS Ph.D. Thesis
Chi-Sing Keung 1980 112 p
Avail: Univ. Microfilms Order No. 8023511

Surface distribution or sources of sinks are used to transform the governing boundary value problem into one which is described by a set of integral equations with the strengths of the sources or sinks as unknowns. A multiphase problem can be divided into as many single phase problems as there are phases. These single phase problems are coupled by the boundary conditions at the interfaces, but each phase may have its own distinct thermophysical properties. Discretization of the boundary surfaces and the time domain allows further reduction of the integral equations into a set of algebraic equations. Since the space discretization of the problem needs to be carried out only on the boundary surfaces, this method can be easily applied to problems with arbitrary domains. Example calculations involving temperature, heat flux and/or convection boundary conditions were performed for the inward solidification of square and elliptical prisms, and for melting problems with boundary surfaces of sinusoidal shapes. Results of these examples were compared with those available in the literature. Dissert. Abstr.

N80-33705 Iowa Univ., Iowa City.
TURBULENT HEAT TRANSFER TO LIQUID METALS IN A CIRCULAR PIPE Ph.D. Thesis
Jenq-Shing Chiou 1980 197 p
Avail: Univ. Microfilms Order No. 8022006

Turbulent heat transfer in liquid metal flows through a circular pipe is investigated. Three regions in the pipes are considered: (1) fully-developed region; (2) developing temperature region; (3) developing velocity and temperature region. The mixing length hypothesis of van Driest is adapted to model the turbulent eddy viscosity and Cebeci's turbulent eddy conductivity model is extended to model the turbulent energy transport. The numerical solutions are obtained from modified Patankar-Spalding computer code. Solutions for both isothermal and constant heat flux wall conditions are presented and verified by comparison with available experimental data and other theoretical predictions. Simple correlation formulae for the Nusselt number for the FD, DT, and DVT regions are provided. Thermal conductivity of the pipe material and the thickness of the pipe wall have a significant effect on the temperature distribution. Dissert. Abstr.

N80-33706 Carnegie-Mellon Univ., Pittsburgh, Pa.
DISPERSED FLOW HEAT TRANSFER IN CIRCULAR TUBES Ph.D. Thesis
Anil Gangaram Rane 1980 293 p
Avail: Univ. Microfilms Order No. 8020632

The laminar and turbulent dispersed flow heat transfer problems are formulated introducing the droplet heat transfer as an equivalent heat sink uniformly distributed in the vapor stream. The formulation identifies the heat sink parameter, the liquid loading parameter, and the wall superheat parameter as the significant parameters in the convective heat transfer to dispersed flow. The analysis confirms that the degree of liquid dispersion, the liquid loading, and the driving potential for heat transfer have strong influence on the dispersed flow heat transfer in the thermal entrance region of a circular tube. Furthermore, it is observed that the heat sink parameter quantifies the heat transfer enhancing and that in heat flux controlled systems the sharp rise in wall temperature is delayed. The turbulent droplet flow heat transfer analysis confirms the strong influence of the nondimensional groups. It is identified that the wall temperature variation in the fully developed region is governed by the liquid loading and wall superheat parameters. The wall temperatures predicted for the turbulent droplet flow heat transfer compare very well with the available experimental data. Dissert. Abstr.

N80-33707 Miami Univ., Coral Gables, Fla.
MATHEMATICAL MODELLING OF TWO-PHASE FLOW OSCILLATIONS Ph.D. Thesis
Kazim Mehmet Akyuzlu 1980 313 p
Avail: Univ. Microfilms Order No. 8022873

A mathematical model was developed to study the stability

characteristics of a single channel, electrically heated, forced convection upflow system. The model was based on the assumptions of homogeneous two phase flow and thermodynamic equilibrium of the phases. The effects of the two phase viscosity and heat transfer, gravitational forces, and the compressibility of the two phase region were included in the formulation. The model consisted of a set of nonlinear hyperbolic partial differential equations. These equations solved by explict finite difference equations, digital computer. Comparison with experiments showed that the model was satisfactory in simulating the density wave type oscillations. The model was found to be sufficiently accurate to predict the stability-instability boundaries at various flow conditions. With further simplification the model was also used to simulate successfully, the low frequency oscillations, i.e., pressure drop type oscillations. Dissert. Abstr.

N80-33708 City Univ. of New York, N. Y.
AN AIR-VAPOR-DROPLET LOCAL INTERACTION MODEL FOR SPRAY UNITS Ph.D. Thesis
Stephen John Palaszewski 1980 166 p
Avail: Univ. Microfilms Order No. 8023726

A three dimensional model for predicting the flow and thermal characteristics of spray units is presented. In a marked departure from present theories, the model examines the local variation in properties of both the air and the droplets throughout the flow field encompassing the spray umbrella. The model allows the air streamlines and droplet trajectories to follow substantially different paths and is able to determine the local change in the environment of the droplets throughout their motion. The conservation equations to determine the local absolute humidity, velocity, and dry-bulb temperature of the air-vapor phase are written in Lagrangian form where the droplets are treated as spatially varying sources of mass, momentum, and energy. Source strength is determined by the interaction between the air-vapor and droplet phases. Model predictions of droplet return temperature along the spray perimeter were compared with data for two substantially different sprays used for power plant cooling. Predictions of downwind wet-bulb temperature were compared with available data. Good agreement was observed. A parametric study was carried out to determine an optimum spray unit design. Dissert. Abstr.

N80-33709 Princeton Univ., N. J.
SUPERHEATING AND BOILING OF WATER IN HYDROCARBONS AND OF HYDROCARBON MIXTURES Ph.D. Thesis
Charles Thomas Avedisian 1980 193 p
Avail: Univ. Microfilms Order No. 8023814

The effects of ambient pressure and liquid phase composition on the nucleation and boiling characteristics of liquids superheated within immiscible host fluids were studied. The mechanism by which fuel drops which are liquid-liquid emulsions or miscible solutions of volatile and nonvolatile liquids would explode or spontaneously break apart while burning is examined. Boiling temperature and pressure of superheated liquid water droplets, water-in-n-paraffin emulsions, and binary solutions of the normal alkanes are discussed. A model for the rate of formation of microscopic bubbles within superheated binary liquid systems (liquid-liquid emulsions and binary liquid solutions) was developed in order to determine the conditions under which bubble nucleation within liquid emulsions or solutions would occur. Dissert. Abstr.

N80-33710 Texas Univ. at Austin.
ANALYSIS OF IN-LINE FLOW-INDUCED VIBRATIONS USING LINEARIZATION METHODS Ph.D. Thesis
Tien-Wei Chen 1980 199 p
Avail: Univ. Microfilms Order No. 8021413

In line flow induced vibrations of structures are investigated. A simplified single degree of freedom system and a discrete multi-degree of freedom system are examined. The response of marine riser systems used in offshore drilling operations is considered. Deterministic harmonic and random Gaussian models are examined. The equivalent linearization technique is applied to treat the nonlinear differential equation describing the fluid structure interaction. The reliability of the approaches are examined by comparing their results with the exact solutions obtained by direct integration of the nonlinear equation of motion. Particular emphasis is given to the dependence of important design parameters of the riser system on several environmental variables. Dissert. Abstr.

N80-33711 California Inst. of Tech., Pasadena.
EXPERIMENTAL INVESTIGATIONS OF THE TRANSPORT PROPERTIES OF FLOW SUSPENSIONS. 1: MEASUREMENT OF VELOCITY DISTRIBUTIONS OF SUSPENSION FLOWS IN A RECTANGULAR CHANNEL. 2: EXPERIMENTAL STUDY OF THE EFFECTIVE THERMAL CONDUCTIVITY IN SHEAR FLOW OF A SUSPENSION. 3: THE USE OF FLUORESCENCE CORRELATION SPECTROSCOPY TO MEASURE MOLECULAR DIFFUSION AND VELOCITY DISTRIBUTIONS Ph.D. Thesis
Ernest Ying-Chee Chung 1980 214 p
Avail: Univ. Microfilms Order No. 8021676

An experimental method capable of measuring the velocities of both the dispersed and suspending phases of a flowing suspension was developed. The method was shown to be capable of measuring the velocity distributions of moderately concentrated suspensions. By using a modified laser Doppler anemometer, the velocity distribution of the suspended fluid was approximated by measuring the velocity of small fluorescent tracers, while the scattered signal from the suspended particles gave a direct measurement of their velocity distribution. The measurements of the effective thermal conductivity of sheared suspension of rigid spherical particles are also described. The objective was to verify the theoretical prediction of Leal (1973) for a dilute suspension undergoing shear at low particle Peclet number, and to extend the range of the experiments to conditions beyond the scope of the theory. Surprisingly, reasonable agreement with the theoretical prediction was observed even for suspensions of moderate concentrations and higher Peclet numbers. An analysis on the use of fluorescence correlation spectroscopy to measure molecular diffusion and velocity distributions in a sheared flow is also presented. Dissert. Abstr.

N80-33712 Illinois Univ. at Chicago Circle, Chicago.
PULSATING FLOW AND HEAT TRANSFER IN CURVED TUBES Ph.D. Thesis
Nasri Jubraeil Rabadi 1980 274 p
Avail: Univ. Microfilms Order No. 8023248

Curved tube heat transfer in pulsating fully developed laminar flow of an incompressilbe, viscous Newtonian fluid with constant properties is studied. The thermal boundary condition of axially uniform heat flux and peripherally uniform wall temperature is considered. The flow equations are written using toroidal geometry and in terms of vorticity, stream function, and axial velocity. No restrictions are made on the tube curvature although the coil pitch effects are neglected. It is concluded that, for this range of parameters, the effects of pulsation on the local values and the peripheral distribution of shear stresses and Nusselt number are significant. However, the time averaged peripherally averaged shear stresses and Nusselt number are not significantly effected by pulsation unless the frequency parameter alpha is low and the pressure ratio k is high. For these conditions, where flow reversal occurs, the time averaged peripherally averaged Nusselt number decreases significantly whereas, it slightly decreases if the Prandtl number is high. Dissert. Abstr.

N80-33713 Illinois Univ. at Chicago Circle, Chicago.
AN ACCURATE AND COMPUTATIONALLY FAST FORMULATION FOR RADIATIVE FIELDS AND HEAT TRANSFER IN GENERAL, PLANE-PARALLEL, NON-GREY MEDIA WITH ANISOTROPIC SCATTERING Ph.D. Thesis
Ajay Sharma 1980 291 p
Avail: Univ. Microfilms Order No. 8023251

A radiative transfer formulation is applicable to non-grey, plane-parallel, inhomogeneous media with anisotropic scattering is presented. The formulation is based upon the use of certain scattering functions to calculate the diffuse intensity fields in the medium. These scattering functions represent the response of the medium for unidirectional point probes (driving illumination). A computationally fast 'adding' scheme is used to calculate the scattering functions. The adding method is based upon the linearity of the radiative transfer equation, which allows superposition of finite medium layers while calculating the scattering functions. General reflecting boundary surfaces are included in this scheme. A parallel invariant imbedding program, which provides exact

but computationally expensive results, is used to characterize the accuracy of the adding procedure. This comparison yields a rule of thumb which helps in estimating and controlling errors. Dissert. Abstr.

N80-33714*# Sheffield Univ. (England). Combustion Aerodynamics Research Lab.
VAPORIZATION OF DROPLETS IN PREMIXING CHAMBERS Final Report, 1 Oct. 1978 - 30 Sep. 1980
A. J. Yule and N. A. Chigier Sep. 1980 9 p refs
(Grant NsG-7517)
(NASA-CR-163616; CARL-IM-80-04) Avail: NTIS HC A02/MF A01 CSCL 20D

Detailed measurements were made of the structures of turbulent fuel sprays vaporizing in heated airstreams. The measurements show the size dependent vaporization and dispersion of the droplets and the important influence of the large eddies in the turbulence. The measurements form a data base for the development of models of fuel spray vaporization. Two laser techniques were specially developed for the investigation. A laser tomography technique converts line-of-sight light scattering measurements into time averaged 'point' measurements of droplet size distribution and volume concentration. A laser anemometer particle sizing technique was further developed to permit accurate measurements of individual particle sizes and velocities, with backscatter collection of light. The experiments are combined with heat transfer models to analyze the performance of miniature thermocouples in liquid sprays. Author

N80-33715*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON THE PERFORMANCE OF EXPLICIT AND IMPLICIT ALGORITHMS FOR TRANSIENT THERMAL ANALYSIS
Howard M. Adelman and Raphael T. Haftka (Illinois Inst. of Tech., Chicago) Sep. 1980 39 p refs
(NASA-TM-81880) Avail: NTIS HC A03/MF A01 CSCL 20D

The status of an effort to increase the efficiency of calculating transient temperature fields in complex aerospace vehicle structures is described. The advantages and disadvantages of explicit and implicit algorithms are discussed. A promising set of implicit algorithms, known as the GEAR package is described. Four test problems, used for evaluating and comparing various algorithms, have been selected and finite element models of the configuraitions are discribed. These problems include a space shuttle frame component, an insulated cylinder, a metallic panel for a thermal protection system and a model of the space shuttle orbiter wing. Calculations were carried out using the SPAR finite element program, the MITAS lumped parameter program and a special purpose finite element program incorporating the GEAR algorithms. Results generally indicate a preference for implicit over explicit algorithms for solution of transient structural heat transfer problems when the governing equations are stiff. Careful attention to modeling detial such as avoiding thin or short high-conducting elements can sometimes reduce the stiffness to the extent that explicit methods become advantageous. A.R.H.

N80-33716*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A COMPENDIUM OF COMPUTATIONAL FLUID DYNAMICS AT THE LANGLEY RESEARCH CENTER
Aug. 1980 273 p refs
(NASA-TM-81877) Avail: NTIS HC A12/MF A01 CSCL 20D

Through numerous summary examples, the scope and general nature of the computational fluid dynamics (CFD) effort at Langley is identified. These summaries will help inform researchers in CFD and line management at Langley of the overall effort. In addition to the inhouse efforts, out of house CFD work supported by Langley through industrial contracts and university grants are included. Researchers were encouraged to include summaries of work in preliminary and tentative states of development as well as current research approaching definitive results. L.F.M.

N80-33717*# California Univ., Los Angeles. School of Engineering and Applied Science.
VAPORS-LIQUID PHASE SEPARATOR Final Report
T. H. K. Frederking, G. S. Brown, C. Chuang, Y. Kamioka, Y. I. Kim, Jeffrey Marshall Lee, and S. W. K. Yuan Oct. 1980 59 p
(Grant NCC2-64)
(NASA-CR-163621; UCLA-ENG-8073) Avail: NTIS HC A04/MF A01 CSCL 20D

The use of porous plugs, mostly with in the form of passive devices with constant area were considered as vapor-liquid phase separators for helium 2 storage vessels under reduced gravity. The incorporation of components with variable cross sectional area as a method of flow rate modification was also investigated. A particular device which uses a shutter-type system for area variation was designed and constructed. This system successfully permitted flor rate changes of up to plus or minus 60% from its mean value. A.R.H.

N80-33718*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A RAPID IMPLICIT-EXPLICIT SOLUTION TO THE TWO-DIMENSIONAL TIME DEPENDENT INCOMPRESSIBLE NAVIER-STOKES EQUATIONS Final Report
Joseph E. Davis Oct. 1980 24 p refs
(NASA Order A-50807-B)
(NASA-CR-3330) Avail: NTIS HC A02/MF A01 CSCL 20D

A second-order time-accurate and spatially factored algorithm was used in a finite difference scheme for the numerical solution of the time-dependent, incompressible, two dimensional Navier-Stokes equations in conservation-law form using vorticity and stream function variables. The systems of equations are solved at each time step by an iterative technique. Numerical results were obtained for a circular cylinder at a Reynolds number of 15, and an NACA 0012 airfoil at zero angle of attack at Reynolds numbers of 10 to the third and 10 to the fourth powers. The results are in agreement with another numerical technique, and the computing time required to obtain the steady state solution at the Reynolds number of 10 to the 4th power was 49.7 sec on CDC 7600 computer using a 65 x 84 computational grind. A.R.H.

N80-33719*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CALCULATION OF LAMINAR HEATING RATES ON THREE-DIMENSIONAL CONFIGURATIONS USING THE AXISYMMETRIC ANALOGUE
H. Harris Hamilton, II Sep. 1980 80 p refs
(NASA-TP-1698; L-13748) Avail: NTIS HC A05/MF A01 CSCL 20D

A theoretical method was developed for computing approximate laminar heating rates on three dimensional configurations at angle of attack. The method is based on the axisymmetric analogue which is used to reduce the three dimensional boundary layer equations along surface streamlines to an equivalent axisymmetric form by using the metric coefficient which describes streamline divergence (or convergence). The method was coupled with a three dimensional inviscid flow field program for computing surface streamline paths, metric coefficients, and boundary layer edge conditions. Author

N80-33720# Purdue Univ., Lafayette, Ind.
COHERENT STRUCTURES IN THE SIMILARITY REGION OF A TWO-DIMENSIONAL TURBULENT JET: A VORTEX STREET
James Walter Oler and Victor W. Goldschmidt Mar. 1980 199 p refs
(Contract N00014-75-C-1048; Grants NSF ENG-74-20780; NSF GK-19317)
(AD-A088750; HL-80-6) Avail: NTIS HC A09/MF A01 CSCL 20/4

The characteristics of the coherent structures of a plane jet were evaluated experimentally and with a kinematic numerical representation. Distributions of intermittency and interface crossing frequency were measured for 10 less than or equal to x/D less than or equal to 60. These properties, including the maximum interface crossing frequency, were found to scale as self-preserving flow variables. Spatially coherent patterns within the turbulent velocity field were evaluated utilizing two point velocity correlation measurements. From these, it was found that the instantaneous velocity fluctuation distributions are antisymmetric with respect to the centerline and coherent over the entire width

of the flow field. In addition, the patterns are periodic in the streamwise direction. The two dimensionality of the large structures was evaluated through the comparison of longitudinal and vertical integral length scales derived from correlations in both the fully turbulent zone and the intermittent region. GRA

N80-33721# Aeronautical Research Labs., Melbourne (Australia).
TECHNIQUES FOR EXAMINING DROP SIZE SPECTRA IN WATER SPRAYS AND CLOUDS
F. W. Skidmore and R. E. Pava Apr. 1979 35 p refs
(ARL/Mech-Eng-Note-375; AR-001-729) Avail: NTIS HC A03/MF A01

Qualitative comparisons were made of water drop sampling methods for sprays and clouds, employing slides coated with oil, gelatin and soot. Oil-wetted and soot coated slides were compared quantitatively when exposed in nominally identical water sprays simulating natural clouds. When compared with gelatin and oil-wetted slides, soot slides are more convenient to prepare, expose and analyze, and records are permanent. Within the inherent limitations of all spray sampling methods, drop size distributions and mean drop sizes given by the oil and soot methods are in substantial agreement, provided that known sources of error of the oil-wetted method are allowed for. Soot slides appear to be capable of detecting ice particles in clouds; quantitative calibrations relating ice impingement impressions to crystal size are required. Author

N80-33722# Pennsylvania State Univ., University Park. Applied Research Lab.
AN INVESTIGATION OF THE HEAT TRANSFER AT THE LIQUID/SOLID INTERFACE OF RAPIDLY MELTING ICE M.S. Thesis, May 1980
Joseph Edward Fredley 25 Mar. 1980 102 p refs
(Contract N00024-79-C-6043)
(AD-A089099; ARL/PSU-TM-80-94) Avail: NTIS HC A06/MF A01 CSCL 07/4

This paper describes an experimental and analytical investigation of a system capable of rapidly melting ice. The melting technique used involved forcing a cylindrical ice slug against a heated surface, letting the effluent fluid exit radially. An analytical model based on fundamental physical principles was developed and used to predict the behavior of the system. Liquid layer thickness, liquid bulk temperature, radial pressure distribution in the liquid layer, convective heat transfer coefficient, and ice melt rate were all computed for steady state operation of the system. Experiments were performed to verify the model predictions. The tests measured the ice melt velocity and exit bulk temperature at a known supply pressure. The input heat flux was determined using two independent methods of calculation. One technique found the conduction heat flux leaving the heated block by using two heated block temperature measurements spaced a known distance apart near the liquid/block surface. The second method applied the measured ice melt velocity and liquid bulk temperature to an energy balance on the liquid film to yield an input heat flux value. A comparison of the experimental results with the analytical model predictions is made demonstrating satisfactory agreement. GRA

N80-33723# Scientific Research Associates, Inc., Glastonbury, Conn.
COMPUTATION OF DISCRETE HOLE FILM COOLING FLOW
J. P. Kreskovsky, W. R. Briley, and H. McDonald May 1980 24 p refs
(Contract F49620-78-C-0038)
(AD-A088807; R80-910002-2; AFOSR-80-0687TR) Avail: NTIS HC A02/MF A01 CSCL 20/13

An analysis and computational procedure are described here for predicting flow and heat transfer which results from coolant injection through a single row of round holes oriented normal to a flat surface. The present method solves the compressible Navier Stokes equations and utilizes zone embedding, surface oriented coordinates, iterative boundary conditions, and an efficient split LBI scheme. The approach treats the near hole flow region where the film cooling flow is initially established. A sample laminar flow calculation is presented for a ratio of normal injection to free stream velocity of 0.1. Although present results do not include heat transfer predictions, details of the interaction between injectant and main stream flow near the hole exit are in qualitative agreement with experimental observations for other flow conditions. GRA

N80-33724# Harry Diamond Labs., Adelphi, Md.
THE EXTENDED RAYLEIGH THEORY OF THE OSCILLATION OF LIQUID DROPLETS
Clyde A. Morrison, Richard P. Leavitt, and Donald E. Wortman May 1980 27 p
(DA Proj. 1L1-61101-A-91A)
(AD-A088894; HDL-TR-1924) Avail: NTIS HC A03/MF A01 CSCL 20/6

The Rayleigh theory of oscillation of liquid drops has been extended to include the case in which the drop is immersed in a uniform electric field. The resonant frequencies of the modes of the drop are shown to be shifted by the electric field. The magnitude and the direction of the shift are dependent on the dielectric constant of the drop. The condition for instability of drops in large electric fields is given and found to differ from that found by previous workers. This difference is attributed to the assumptions by previous workers that the drops, under the influence of an electric field, distorted into ellipsoids of revolution about the field direction. The dynamical equations are derived, and the solution for small oscillation is given. GRA

N80-33725# Weidlinger Associates, New York.
UNCOUPLING APPROXIMATION IN FLUID-STRUCTURE INTERACTION PROBLEMS WITH CAVITATION Topical Report, 1 Dec. 1978 - 28 Feb. 1980
F. L. DiMaggio, I. S. Sandler, and D. Rubin 28 Feb. 1980 30 p
(Contracts DNA001-79-C-0078; DNA001-79-C-0256)
(AD-A088911; AD-E300892; DNA-5191T) Avail: NTIS HC A03/MF A01 CSCL 20/4

Linear and nonlinear methods are presented for the decoupling of fluid-structure interaction problems in which cavitation occurs. These methods are tested against a one dimensional case with a known solution. On this basis the nonlinear approach is recommended for use in multi-dimensional problems and an algorithm for its implementation is given. GRA

N80-33726# Los Alamos Scientific Lab., N. Mex.
SIMILITUDE MODELING OF NATURAL CONVECTION HEAT TRANSFER THROUGH AN APERTURE IN PASSIVE SOLAR HEATED BUILDINGS Thesis
Dennis David Weber Jun. 1980 124 p refs
(Contract W-7405-eng-36)
(LA-8385-T) Avail: NTIS HC A06/MF A01

An experimental study of natural convection heat transfer through a doorway in a two room passive solar heated building is described. Similitude modeling was the method used to measure natural convection heat transfer coefficients (h/sub NC/) in a model geometrically scaled down by a factor of 5. Freon gas was used as the working fluid to obtain dynamic similarity within the model. A temperature difference was maintained between the two rooms by a heated vertical wall which simulated a Trombe wall in one room, and by a cooled vertical wall which simulated a thermal storage wall in the other room. Heat transfer through the doorway was measured as a function of a characteristic temperature differential and the geometry of the doorway. DOE

N80-33614# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
VIBRATIONS OF SEVERAL OBSTACLES WITHIN THE TWO DIMENSIONAL FLOW OF INCOMPRESSIBLE FLUID
Robert Legendre *In its* La Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 1-12 Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 1-8 Original report in FRENCH previously announced as A80-26158 (For primary document see N80-33613 24-31)
Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N80-33727 Arizona State Univ., Tempe.
APPLICATIONS OF COMPUTER-GENERATED HOLOGRAMS IN OPTICAL TESTING Ph.D. Thesis
John Scott Loomis 1980 229 p
Avail: Univ. Microfilms Order No. 8022835

Various encoding methods for making computer generated holograms are discussed, and a new method is presented that can easily be used on image recorders intended for image processing applications. This general encoding method has many characteristics in common with earlier computer generated holograms. Examples are given to demonstrate the properties of synthetic holograms and the differences among different encoding techniques. A computer ray trace code was developed to model the optical performance of equipment used in optical testing. A detailed prescription is given for making a computer generated hologram for a commercial interferometer designed for use with holograms. Problems of finding the proper focal point, the correct hologram size, and preparation of the final hologram image are discussed. An example of an actual test is included. Finally, an analysis of various errors encountered and the limitations of the methods used is presented. Within these limitations, computer generated holograms can easily and routinely be used to test aspheric optical components. Dissert. Abstr.

N80-33728# National Inst. for Aeronautics and Systems Technology, Pretoria (South Africa).
INTRODUCTION TO THE FUNDAMENTALS OF STRAIN GAUGE PRACTICE
R. I. Watkins Dec. 1979 42 p refs
(NIAST-79/154; ISBN-0-7988-1725-9) Avail: NTIS HC A03/MF A01

The practical aspects of strain gauging are discussed. Attention is given to the selection of a suitable type of strain gauge for any particular application and the types of adhesives to be used under certain conditions. The application of the Wheatstone Bridge circuit to various strain gauge configurations and error cancellation in adverse conditions is also described. The measurement of a few elementary load cases is discussed. A.R.H.

N80-33729# Philips Labs., Briarcliff Manor, New York.
DEVELOPMENT OF AN ELECTROPHORETIC IMAGE DISPLAY Quarterly Technical Report, 1 Feb. - 30 Apr. 1980
Richard Liebert, Joseph Lalak, and Karl Wittig May 1980 22 p
(Contract MDA903-79-C-0439; DARPA Order 3802)
(AD-A089121) Avail: NTIS HC A02/MF A01 CSCL 09/5

The purpose of this work is to develop a 350 x 600 element X-Y addressed ElectroPhoretic Image Display (EPID). Development of the fabrication techniques for this display continues. Near-perfect seals between the substrate and grid dielectric were obtained. Ion-beam milling of Mylar in 70% oxygen: 30% argon has eliminated operational difficulties encountered with pure oxygen. No change in either the absolute or differential milling rates was observed as a result of the addition of the argon to the oxygen. Several tests have confirmed the compatibility between the materials used in fabricating the device and the components of the electrophoretic suspension. Digitization and ordering of the photolithographic masks for the 512 character display is complete. Design of the display electronics and packaging are in progress. A microprocessor interfaced to the IEEE-488 bus and an ASCII-to-5x7 character generator will provide the necessary signals to the integrated row and column drivers. The display will be mounted, using conductive elastomer interconnections, to a printed circuit board which will provide sockets for connection of the cables form the electronics package. This system will accept ASCII information from a computer connected to an IEEE-488 bus and display the printable information on the EPID as 16 lines of 32 characters each.GRA

N80-33730# Allied-General Nuclear Services, Barnwell, S.C.
AUTOMATED CALIBRATIONS AND DYNAMIC CORRECTIONS FOR DIFFERENTIAL PRESSURE TRANSMITTERS
John M. Crawford Jun. 1980 13 p refs Presented at the 21st Ann. Meeting of the Inst. of Nucl. Mater. Management, Palm Beach, Fla., 30 Jun. - 2 Jul. 1980
(Contract DE-AC09-78ET-35900)
(AGNS-35900-Conf-65; CONF-800655-19) Avail: NTIS HC A02/MF A01

A large reprocessing plant is a complex operation with dynamic inventories being required to provide for timely detection of attempted diversion of nuclear materials. The real-time, on-line process measurement capability controls the effectiveness of the dyanmic techniques. An economical method to eliminate bias and significantly improve process differential pressure transmitter measurements is evaluated. Errors up to 1.0% have been reduced to less than 0.1%. DOE

N80-33731# SRI International Corp., Menlo Park, Calif.
DEVELOPMENT AND EVALUATION OF A PROTOTYPE AUTOMATED TELEPHOTOMETER SYSTEM Final Report
W. Viezee and W. E. Evans Jun. 1980 56 p refs
(EPRI Proj. 862-14)
(EPRI-EA-1434) Avail: NTIS HC A04/MF A01

Hardware and software components of an automated telephotometer system to monitor daytime visibility and visibility degradation in pristine air quality areas are assembled and calibrated. The optical sensor is a reticon solid state line scanner with a 15 degree viewing angle in a single vertical plane. When directed at a distant scene or landmark, the camera gives a brightness measurement at 256 successive elements along the vertical scanning, thereby providing a detailed profile of scene brightness. Brightness measurements are recorded in terms of the light intensity integrated over the standard spectral (photopic) response of the human eye. A computer controlled, lightweight rotator scans the sensor in azimuth at 1.57 milliradian increments. Two computer algorithms are implemented into the prototype system. One computes average brightness across selected landmarks or vistas and across nearby portions of the background sky to determine apparent brightness contrast. The other algorithm determines the brightness structure or brightness standard deviation across selected vistas. DOE

N80-33428*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE TABLE MOUNTAIN 8-mm-WAVELENGTH INTERFEROMETER
M. A. Janssen, S. Gulkis, E. T. Olsen, B. L. Gary, F. S. Soltis, and N. I. Yamane *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 1-8 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

N80-33441*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NOISE ADDING RADIOMETER PERFORMANCE ANALYSIS
C. Stelzried *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 98-106 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 14B

N80-33615# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
ULTRASOUND LEVEL-METER FOR MEASURING PROPELLANT LEVELS IN ARIANE TANKS IN ITS FIRST AND SECOND STAGES
Jean-Claude Demarais and Alain Deom *In its* La Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 13-30 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 9-22 Original report in FRENCH previously announced as A80-26159 (For primary document see N80-33613 24-31)
Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

N80-33617# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
THE ONERA VACUUM ULTRAVIOLET SPECTROGRAPH AND ITS USE FOR THE STUDY OF SURFACE LAYERS IN TITANIUM AND ITS ALLOYS
Frima Malamand and Bernard Daigne *In its* La Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 41-49 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 31-37 Original Report in FRENCH previously announced as A80-26161 (For primary document see N80-33613 24-31)
Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

N80-33618# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
IN SITU EXPERIMENTS IN THE 1 MV ELECTRON MICROSCOPE. PART 1: FEASIBILITY AND METHODOLOGY
Roger Valle, Bernard Genty, and Alain Marraud *In its* La Rech. Aerospatiale Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) p 51-80 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 39-61 (For primary document see N80-33613 24-31)
Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

N80-33619# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
A DIGITAL UNIT FOR MEASURING UNSTEADY PRESSURE COEFFICIENTS
Claude Christoux and Alain Gravelle *In its* La Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 81-88 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 63-68 Original report in FRENCH previously announced as A80-26162 (For primary document see N80-33613 24-31)
Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

N80-33620# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
AN ELECTRICAL METHOD OF MEASURING STRAIN AND DAMAGE
Georges Cailletaud, Humbert Policella, and Georges Baudin *In its* Rech. Aerospatiale, Bi-Monthly Bull. No. 1980-1 (ESA-TT-651) Jul. 1980 p 89-97 refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1980-1, Jan. - Feb. 1980 p 69-75 (For primary document see N80-33613 24-31)
Avail: NTIS HC A05/MF A01; ONERA, Paris FF 40

36 LASERS AND MASERS

Includes parametric amplifiers.

N80-33732 California Univ., San Diego.
STIMULATED EMISSION PROCESSES FROM FREE ELECTRONS Ph.D. Thesis
Wayne Alan McMullin 1980 223 p
Avail: Univ. Microfilms Order No. 8023105

Simulated emission by a relativistic beam of electrons is considered along the direction of motion for the cases in which the electrons are accelerated in a pump field that is either an electromagnetic wave, or TE cylindrical waveguide mode, or a transversely polarized, spatially periodic magnetic field with the emitted wave frequency Doppler upshifted from that of the pump field. Stimulated emission from a relativistic beam of electrons is considered under acceleration in parallel, static electric and magnetic fields subject to the conditions that the photon energy and Landau orbital energy of the electrons in the magnetic field are much less than the electron kinetic energy. The distribution function obtained from the kinetic equation is used to calculate the induced current driving the emitted field and the induced current is used in the wave equation for the emitted field from which the amplification is studied. Dissert. Abstr.

N80-33733 Southern Methodist Univ., Dallas, Tex.
MODE STRUCTURE OF Al SUB XGa SUB L-XAs INJECTION LASERS Ph.D. Thesis
Delaney Joseph Baxter 1980 116 p
Avail: Univ. Microfilms Order No. 8022606

The lateral dielectric constant in stripe geometry injection lasers is modeled with a step and a parabolic denepdence. For the step profile, a set of cutoff curves for the lateral modes is used to compare various laser designs. As the vertical geometry of a laser is varied a contour is described on the cutoff curves which is a measure of lateral mode stability. Two laser designs examined are the simple stripe geometry and channeled substrate planar lasers. The parabolic model of the lateral dielectric constant is extended to include matched fields at the vertical heterojunctions. A result is a deformed fundamental mode shape in the case of small normalized frequencies and depression of the refractive index under the stripe. This presents an alternative explanation for the shoulders that have heretofore been attributed to leaky waves. An experimental scheme is devised to measure the free carrier effect on the refractive index in GaAs active regions of injection lasers. Transverse field and modal selection mechanisms of the active cavity are characterized for a broad area high power laser as a function of temperature and injection level. The amount of index depression as a result of carrier increase in the active region is measured to be (3-9) x 10 to the -27 power cu m. Dissert. Abstr.

N80-33734 Cornell Univ., Ithaca, N. Y.
TWO APPROACHES TOWARDS A LOW POWER SOLID STATE LASER Ph.D. Thesis
Lawrence Bennett Medwin 1979 173 p
Avail: Univ. Microfilms Order No. 8020916

Two approaches towards the goal of preparing a low power solid state laser are described. The first approach was an attempt to synthesize a material with the desirable peoperties of rare earth optical emission and the convenience of electrical pumping available to the semiconductor laser. The second approach involved developing, fabricating, and characterizing a semiconductor laser with a very small gain region, the buried heterostructure laser. The first approach involved modifying a chemical vapor deposition reactor designed to grow III-V compound semiconductor materials. While neodymium was successfully transported to the crystalline substrate, the desired Nd doped III-V semiconductor material could not be prepared. The second approach, developing a buried heterostructure laser fabrication technology, required an investigation into state of the art etching technology and selective epitaxial deposition of III-V semiconductors. The results of these studies are presented as well as the fabrication technology of the buried heterostructure. The working devices were characterized and electrical and optical models ear proposed to explain their behavior. Dissert. Abstr.

N80-33735*# RCA Labs., Princeton, N. J.
SINGLE-MODE LASER STUDIES: DESIGN AND PERFORMANCE OF A FIXED-WAVE LENGTH SOURCE AND COUPLING OF LASERS TO THIN-FILM OPTICAL WAVEGUIDES Final Report, 3 Jul. 1979 - 3 Apr. 1980
I. Ladany and J. M. Hammer Washington, D.C. Oct. 1980 62 p refs
(NASA-CR-3341; PRRL-80-CR-13; FR-2) Avail: NTIS HC A04/MF A01 CSCL 20E

A module developed for the generation of a stable single wavelength to be used for a fiber optic multiplexing scheme is described. The laser is driven with RZ pulses, and the temperature is stabilized thermoelectrically. The unit is capable of maintaining a fixed wavelength within about 6 A as the pulse duty cycle is changed between 0 and 100 percent. This is considered the most severe case, and much tighter tolerances are obtainable for constant input power coding schemes. Using a constricted double heterostructure laser, a wavelength shift of 0.083 A mA is obtained due to laser self-heating by a dc driving current. The thermoelectric unit is capable of maintaining a constant laser heat-sink temperature within 0.02 C. In addition, miniature lenses and couplers are described which allow efficient coupling of single wavelength modes of junction lasers to thin film optical waveguides. The design of the miniature cylinder lenses and the prism coupling techniques allow 2 mW of single wavelength mode junction laser light to b coupled into thin film waveguides using compact assemblies. Selective grating couplers are also studied. M.G.

N80-33736# Lincoln Lab., Mass. Inst. of Tech., Lexington.
OSCILLATORY BEAM QUALITY EFFECTS IN MODULAR HIGH ENERGY LASER SYSTEMS
Robert C. Harney 15 May 1980 36 p refs
(Contract F19628-80-C-0002; ARPA Order-3724)
(AD-A088655; LTP-41; ESD-TR-80-69) Avail: NTIS HC A03/MF A01 CSCL 20/5

The amplitude of the major phase distortions in in-line modular chemical laser systems increases linearly with the number of modules. The beam quality of a model modular linear-gain laser has been examined as a function of the amplitude of the phase distortion by propagating the distorted output beams to a distant focus using the Lincoln Laboratory laser propagation code. Oscillations are observed in both the peak intensity and the far field area containing 63% of the laser flux. The observed oscillatory behavior is not strongly dependent on the shape of the phase distortion. The implications of this behavior for modular laser design are discussed and extended to modular annular gain lasers. GRA

N80-33737# RCA Government Systems Div., Burlington, Mass. Government Systems Div.
A 2.06 MICRON-LASER RANGEFINDER TECHNOLOGY Final Report, Sep. 1977 - Aug. 1979
Bruce E. Hendrickson and Larry S. Ohara Sep. 1979 71 p refs
(Contract DAAB07-77-C-2197)
(AD-A088836) Avail: NTIS HC A04/MF A01 CSCL 17/6

A laser rangefinder receiver using a photoconductive, thermoelectrically cooled HgCdTe detector was developed for detection of the 2.06 micron wavelength Holmium laser. The HgCdTe receiver was tested with an RCA developed Ho:YLF laser as a laser rangefinder. Quantitative ranging tests were conducted and compared to predicted results utilizing the measured Noise Equivalent Power (NEP) of (5 - 10) (10 to the minue 10th power/square root of (Hz)) of the detector pre-amplifier. A lpps thermoelectrically cooled Ho:YLF laboratory laser was successfully developed and tested to 140 F. GRA

N80-33738# Army Materials Research Agency, Watertown, Mass. Ceramics Research Div.
THE EFFECTS OF LASER RADIATION ON PYROLYTIC SILICON NITRIDE COATINGS ON SLIP-CAST FUSED SILICA SUBSTRATES Final Report
Dennis J. Viechnicki Jul. 1980 16 p refs
(DA Proj. 1L1-62105-AH-84)
(AD-A089130; AMMRC-TR-80-36) Avail: NTIS HC A02/MF A01 CSCL 11/2

Pyrolytic silicon nitride coatings were deposited on slip-cast fused silica substrates. They were characterized and their thermal response is described. A clean heat source in the form of a continuous wave (CW) CO2 welding laser was utilized in the experiment. GRA

N80-33739# Naval Research Lab., Washington, D. C.
DOPPLER VELOCIMETER FOR LASER ACCELERATED TARGETS
S. P. Obenschain, E. A. McLean, and S. H. Gold 28 Aug. 1980 14 p refs
(RR0110941)
(AD-A089134; NRL-MR-4319) Avail: NTIS HC A02/MF A01 CSCL 14/2

A Doppler velocimeter utilizing a spectrograph and a short pulse laser probe is described which provides good spatial (20 microns) and subnanosecond temporal resolution. This system has been used to measure the velocity profiles of targets ablatively accelerated to very high velocities by a high power laser beam. A unique aspect of this velocimeter is that the doppler wavelength shifts are measured directly rather than employing interferometric techniques. GRA

N80-33740# California Univ., Livermore. Lawrence Livermore Lab.
NOVA: A HIGH ENERGY LASER SYSTEM
R. O. Godwin 12 Oct. 1979 8 p refs Presented at Electro-Optics Conf., Tokyo, 23-26 Jan. 1980 Submitted for publication
(Contract W-7405-eng-48)
(UCRL-83204; CONF-800140-1) Avail: NTIS HC A02/MF A01

The laser system and spatial filter are described. The computer control system and the 46 cm disk amplifier are also described. DOE

N80-33741# KMS Fusion, Inc., Ann Arbor, Mich.
INTERACTION OF SHORT WAVELENGTH LASER RADIATION WITH SPHERICAL SHELL TARGETS
D. C. Slater, R. L. Berger, Gar. E. Busch, G. Charatis, R. R. Johnson, F. J. Mayer, D. Mitrovich, R. J. Schroeder, J. D. Simpson, and D. Sullivan 1980 19 p refs Presented at the 8th Intern. Conf. on Plasma Phys. and Controlled Nucl. Fusion Res., Brussels, 1-10 Jul. 1980
(Contract DE-AC08-78DP-40030)
(KMSF-U-953; CONF-800707-14; IAEA-CN-38/I-3) Avail: NTIS HC A02/MF A01

Laser plasma interaction experiments were performed at both 1.05 microns and 0.53 microns. Measurements of absorption and X-ray production from spherical shell targets have shown significant differences between the two laser wavelengths. The laser power on target up to 0.7 TW at 0.53 microns was sufficient to observe effects from a high-temperature corona and confirmed the earlier predictions for wavelength scaling of the hot electron temperature. DOE

N80-33438*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A STUDY OF THE PROCESSES IN THE RF HYDROGEN GAS DISSOCIATOR
L. Maleki *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 68-76 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 20E

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N80-33742 British Library Lending Div., Boston Spa (England).
MAGNETIC-ABRASIVE MACHINING
Anatas Kochemidov, Boris Makedonski, Ivan Dumanov, Stephan Stephanov, Peter Golobov, and Chanasov Atanasov Aug. 1980 13 p refs Transl. into ENGLISH from Mashinostroenie (USSR), v. 25, no. 7, 1976 p 307-309
(BLL-RTS-12400) Avail: British Library Lending Div., Boston Spa, England

The use of magnetic-abrasive machining for obtaining a high degree of surface finish was investigated. The cutting powder is a powder which is held in the area of cutting by a magnetic field. The magnetic particles are continuously changing their orientation, and thus remain shape. The grain size of the ferromagnetic powder, and the speed of the component being treated influence the productivity of the process. It is concluded that magnetic-abrasive treatment offers strong possibilities for machining. F.O.S.

N80-33743 British Library Lending Div., Boston Spa (England).
REASONS FOR THE OCCURRENCE OF SMOOTH WORK SURFACES IN METAL CUTTING
F. Betz Jul. 1980 26 p refs Transl. into ENGLISH from Feitigung (East Germany), no. 5, 1971 p 147-152 Presented at 1971 CIRP Conv., Warsaw
(BLL-RTS-12078) Avail: British Library Lending Div., Boston Spa, England

The microform of the arising workpiece surface in metal cutting depends especially on the cutting speed. The fact that normally a clean burnished surface in the direction of cut arises only at relatively high cutting speeds, leads to the assumption that specific high temperature of the magnitude of transformation at the tool flank is necessary. However, investigations show that during the beginning of a cut a fully burnished cut surface (in the direction of cut) arises also at low cutting speeds. Chip root investigations show that the microform of the cut surface depends on the position of the stagnation zone, which is formed ahead of the cutting edge. It is possible to produce clean burnished

cut surfaces at all cutting speeds by a suitable positioning of this stagnation zone. S.F.

N80-33744 Columbia Univ., New York.
EXPERIMENTAL INVESTIGATION OF HYDRODYNAMIC SELF-ACTING GAS BEARINGS AT HIGH KNUDSEN NUMBERS Ph.D. Thesis
Yiao-Tee Hsia 1980 148 p
Avail: Univ. Microfilms Order No. 8023504

The slip flow theory for modelling hydrodynamic gas bearing with clearances below 25 micrometer m was investigated. An interferometric technique using two CW lasers is used to measure the small clearances with an 0.025 micrometer m accuracy. The pitch and roll angles of the slider bearing and the surface contour of the slider are also measured interferometrically. The effects of molecular rarefaction are studied by operating the bearing in different gas media with different mean free paths. Air is used to study Knudsen number below 0.5 while helium is used to study Knudsen number above 0.5. Training edge clearances and pitch angles are compared with theoretical predictions using the modified Reynolds equation with velocity slip boundary conditions. The modified Reynolds equation is solved using two different numerical algorithms. Excellent agreement between experiment and theory is found for clearances as high as 1.60 micrometer m to as low as 0.075 micrometer m with corresponding ambient Knudsen number of 0.04 and 2.51, respectively. Dissert. Abstr.

N80-33745 Texas Univ. at Austin.
A MODELING TECHNIQUE FOR DESIGN AND SIMULATION OF HYDROSTATIC JOURNAL BEARINGS Ph.D. Thesis
Keith Michael Tolk 1980 171 p
Avail: Univ. Microfilms Order No. 8021522

A bearing model which accurately indludes the nonlinear bearing effects is presented. The bearing model when properly implemented on the computer can evaluate the required force in only a few milliseconds. In addition, various effects can be included or omitted from the model so that their effect on the dynamics of the system can be isolated. The model consists of a set of analytical solutions for the forces and flows in various parts of the bearing using one dimensional forms of the Reynold's equation. These individual solutions are then combined using correction factors obtained by solving the complete Reynold's equation numerically using a finite difference approach. In this manner a solution for the bearing force is obtained which has the accuracy of the finite difference solution but requires only a small fraction of the computational time. Several dimensionless design parameters are defined. These are presented in the form of design curves. In addition, several simulation examples are presented. These examples show steady state orbital behavior and also demonstrate the possible instability of these bearings at high speed. Dissert. Abstr.

N80-33746 Wayne State Univ., Detroit, Mich.
THE BURNING VELOCITY INSIDE A SPARK-IGNITION ENGINE WITH DIFFERENT TURBULENT PROMOTERS Ph.D. Thesis
Sampao Chaibongsai 1979 191 p
Avail: Univ. Microfilms Order No. 8022740

The burning velocity inside the CFR spark ignition engine was studied. The flame propagation was analyzed and an equation was developed for the burning velocity. The experimental part was completed on the CFR spark ignited engine at different compression ratios, speeds, throttle valve openings, and inlet valves. The valves are designed and manufactured to reduce the effect of swirl by using 360 deg shrouds with holes of different diameters (6 mm and 3 mm). The turbulence was promoted by the flow of the charge through the holes in the shrouds. The theoretical analysis showed that the spherical flame front model is more accurate than the cylindrical model, particularly in the early stages of flame propagation. The experimental results indicated that with minimum spark advance for the best torque the compression ratio has a minor effect on the maximum burning velocity. Changes in throttle valve opening, engine speed, and inlet valve, showed a great effect on the maximum burning velocity. Dissert. Abstr.

N80-33747*# Rensselaer Polytechnic Inst., Troy, N. Y. School of Engineering.
A LINEAR PHOTODIODE ARRAY EMPLOYED IN A SHORT RANGE LASER TRIANGULATION OBSTACLE AVOIDANCE SENSOR M.S. Thesis
James Paul Odenthal Dec. 1980 129 p refs
(Grant NsG-7389; Contract JPL-954880)
(NASA-CR-163613; RPI-TR-MP-74) Avail: NTIS HC A07/MF A01 CSCL 20E

An opto-electronic receiver incorporating a multi-element linear photodiode array as a component of a laser-triangulation rangefinder was developed as an obstacle avoidance sensor for a Martian roving vehicle. The detector can resolve the angle of laser return in 1.5 deg increments within a field of view of 30 deg and a range of five meters. A second receiver with a 1024 elements over 60 deg and a 3 meter range is also documented. Design criteria, circuit operation, schematics, experimental results and calibration procedures are discussed. A.R.H.

N80-33748*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
INVESTIGATION OF ELECTRODYNAMIC STABILIZATION AND CONTROL OF LONG ORBITING TETHERS Interim Report, 1 Mar. - 31 Aug. 1980
Giuseppe Colombo, Mario D. Grossi, Marion Dobrowolny, and David A. Arnold Aug. 1980 8 p
(Contract NAS8-33691)
(NASA-CR-161584) Avail: NTIS HC A02/MF A01 CSCL 13I

The possibility of using electrodynamic forces to control pendular oscillations during the retrieval of a subsatellite is investigated. The use of the tether for transferring payloads between orbits is studied. S.F.

N80-33749*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF CAGE DESIGN ON CHARACTERISTICS OF HIGH-SPEED-JET-LUBRICATED 35-MILLIMETER-BORE BALL BEARING
Fredrick T. Schuller, Stanley I. Pinel (Industrial Tectonics, Compton, Calif.), and Hans R. Signer (Industrial Tectonics, Compton, Calif.) Oct. 1980 13 p refs
(NASA-TP-1732; E-289) Avail: NTIS HC A02/MF A01 CSCL 13I

Parametric tests were conducted with a 35 mm bore angular contact ball bearing with a double outer land guided cage. Provisions were made for jet lubrication and outer-ring cooling of the bearing. Test conditions included a combined thrust and radial load at nominal shaft speeds of 48,000 rpm, and an oil-in temperature of 394 K (250 F). Successful operation of the test bearing was accomplished up to 2.5 million DN. Test results were compared with those obtained with similar bearing having a single outer land guided cage. Higher temperatures were generated with the double outer land guided cage bearing, and bearing power loss and cage slip were greater. Cooling the outer ring resulted in a decrease in overall bearing operating temperature. Author

N80-33750# Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
CAVITATION DAMAGE MECHANISMS: EXPERIMENTAL STUDY CAVITATION IN A SPOOL VALVE Final Technical Report, Aug. 1977 - Sep. 1979
C. S. Martin, D. C. Wiggert, and H. Medlarz Wright-Patterson AFB, Ohio AFAPL Feb. 1980 147 p refs
(Contract F33615-77-C-2036)
(AD-A083653; AFAPL-TR-79-2121) Avail: NTIS HC A07/MF A01 CSCL 13/11

Cavitation was investigated in directional control valves in order to identify damage mechanism characteristic of components of aircraft hydraulic systems. Extensive tests were conducted in a representative metal spool valve and in a model three times larger. Both valves are well instrumented for the purpose of accurately measuring mean quantities as well as detecting the onset and extent of cavitation once it developed. Noncavitating data taken with both valves showed that the position of the high velocity, annular jet issuing from the orifice shifted orientation

depending upon valve opening and Reynolds number. By means of high frequency response pressure transducers strategically placed in the valve chamber of each test valve cavitation could be sensed by the correlation of noise with a cavitation index. Cavitation inception could be detected by comparing energy spectra for a fixed valve and a constant discharge. Another sensitive indicator of cavitation inception is the ratio of cavitating to noncavitating spectral densities. The incipient cavitation index as defined in this investigation correlates well with the Reynolds number for both valves. J.M.S.

N80-33751# Little (Arthur D.), Inc., Cambridge, Mass.
POTENTIAL OF SPARK IGNITION ENGINE, ELECTRONIC ENGINE AND TRANSMISSION CONTROL Final Report, Jan. - Jul. 1978
Frank J. Garofalo Mar. 1980 105 p refs
(PB80-192701; DOT-TSC-NHTSA-79-55; DOT-TSC-1046)
Avail: NTIS HC A06/MF A01 CSCL 21G

The characteristics and functions of significant electronic engine and powertrain control systems are identified, evaluated, and documented. Important considerations in the assessment are the powertrain variables controlled, the technology utilized, and the fuel economy gains achieved. A detailed analysis, by engine class and control system technology, is made in order to quantify specific advantages of various electronic systems and their capability to achieve increased engine efficiency and vehicle fuel economy. An attempt is made to identify the minimum technology required to move from the 1978 emission standards to the 1981 emission standards with no fuel economy losses. GRA

N80-33752# Transportation Systems Center, Cambridge, Mass.
POTENTIAL OF DIESEL ENGINE, DIESEL ENGINE DESIGN CONCEPTS, CONTROL STRATEGY AND IMPLEMENTATION Final Report
T. Trella and T. Shen Mar. 1980 61 p refs
(PB80-195746; DOT-HS-805240; DOT-TSC-NHTSA-79-41)
Avail: NTIS HC A04/MF A01 CSCL 21G

Diesel engine design concepts and control system strategies are surveyed with application to passenger cars and light trucks. The objective of the study is to indicate the fuel economy potential of the technologies investigated. The engine design parameters discussed are related to the engine configuration, combustion process, valving, friction, compression ratio, and heat transfer. Various engine control strategies and control implementation are considered. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N80-33753 Texas A&M Univ., College Station.
ANALYSIS OF MARKOV RENEWAL PROCESSES WITH SOME NONREGENERATION POINTS AND THEIR APPLICATIONS TO RELIABILITY THEORY Ph.D. Thesis
Po-Wen Hu 1980 97 p
Avail: Univ. Microfilms Order No. 8023036

Markov renewal theory, a branch of probability theory, is based on the properties of regeneration points. A regeneration point is a random time in a process at which the future development of the process is a probabilistic replica of the process itself, independent of the past history of the process. In industrial applications, Markov renewal theory is useful for modeling a repairable system because repairs are assumed to renew or upgrade the system so that the performance of the system is identical to that of a new one, independent of the past performance records. The number of spare parts needed, percentage of system down time, percentage of idle time of the repair facilities, etc., can be computed Markov renewal theory. However, there are multi-component systems in which the repair activities performed on a single component do not constitute regeneration points for the entire system because the history of the other components can not be disregarded. The Markov renewal theory is modified so that it can be applied to the nonregeneration points of a process. Dissert. Abstr.

N80-33754# Southwest Research Inst., San Antonio, Tex.
SPECIAL ENGINEERING SERVICES TO ESTABLISH INSPECTION CRITERIA FOR BEARINGS TO IMPROVE LIFE PREDICTION Final Report, 1 Jul. 1974 - 30 Nov. 1979
Felix N. Kusenberger and John R. Barton Dec. 1979 168 p refs
(Contract F09603-74-C-5158)
(AD-A088765) Avail: NTIS HC A08/MF A01 CSCL 13/9

The CIBLE (Critical Inspection of Bearings for Life Extension) program concept for quantitative nondestructive evaluation of bearing components is briefly reviewed and the automatic inspection equipment used to acquire the data presented in this report is described. Many examples of significant crack networks detected in the races of vendor reworked bearings as well as subsurface flaw indications in a new bearing are illustrated. The savings realized by elimination of the potential for inclusion nucleated failure from the group of CIBLE inspected bearings is estimated, and the future economic benefits of removing potential failures from the J57- 2 and J57- 4 engine bearings currently in the fleet are also projected. The results of endurance testing bearings with service-induced cracks at low stress levels and flaw indications at higher levels are presented and discussed. The results of metallurgical examination of service induced cracked regions as well as other flaw regions are illustrated, and the results from 1000 balls inspected at the Oklahoma City Air Logistics Center (OCALC) are summarized. A preliminary serviceability criteria for races is outlined and implementation of the criteria is discussed. GRA

N80-33755# Los Alamos Scientific Lab., N. Mex.
EVALUATION OF IN-LINE NONDESTRUCTIVE ASSAY SYSTEMS Progress Report, 1 Jan. - 31 Mar. 1980
D. F. Bowersox, N. Ensslin, S. T. Hsue, S. S. Johnson, J. L. Parker, and T. E. Sampson Jun. 1980 14 p refs
(Contract W-7405-eng-36)
(LA-8411-PR) Avail: NTIS HC A02/MF A01

Specified instruments for in line nondestructive assay of streams of spent fuel processing are tested under realistic conditions for use in effective process control and materials accounting. Progress for the period from January through March 1980 is described. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N80-33756 British Library Lending Div., Boston Spa (England).
THE FORCED OSCILLATION OF THE CIRCULAR PLATES
W. Fluegge Jul. 1980 14 p refs Transl. into ENGLISH from Z. Tech. Phys. (West Germany), v. 13, no. 4, 1932 p 199-205
(BLL-RTS-12070) Copyright. Avail: British Library Lending Div., Boston Spa, England

The forced oscillation of elastic plates at frequencies considerably different from their natural frequencies was investigated. A circular plate was coupled by a thread at its mid-point to an oscillating system of large mass. Excitation by a periodic single force, some singularities of plate flexure, and the excitation by a higher order singularity were studied. It is concluded that an elastic plate can be forced to oscillate at any frequency. F.O.S.

N80-33757 British Library Lending Div., Boston Spa (England).
ANALYSIS AND SYNTHESIS OF OPERATIONAL LOADS
J. H. Argyris, W. Aicher, and H. J. Ertelt May 1979 85 p refs Transl. into ENGLISH of "Analyse und Sythese von Betriebsbelastungen", Rept. ISD-193 Stuttgart Univ., Feb. 1976
(RAE-Lib-Trans-2108(5207); ISD-193) Avail: British Library Lending Div., Boston Spa, England

The inadequate estimation of fatigue lives of structures by theoretical methods has led to the development of techniques for simulating service loading histories in the laboratory. The techniques required for the synthesis of a laboratory loading sequence from service loading data are described using the standard fighter loading sequence, FALSTAFF, as an example.
Author

N80-33758 Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 12, NUMBER 8
Judith Ragle-Eshleman, ed. Aug. 1980 91 p refs
(AD-A089858) Avail: Naval Research Lab., Attn. Code 5804, Washington, D.C. 20375. HC annual rate $100.00

Impact damage done to reinforced composite materials and equivalence techniques for vibration testing are discussed. For individual titles, see N80-33759 through N80-33760.

N80-33759 Florida Univ., Gainesville. Dept. of Engineering Sciences.
LOCALIZED IMPACT PROBLEMS OF COMPOSITE LAMINATES
N. Takeda and R. L. Sierakowski *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 12, No. 8 Aug. 1980 p 3-10 refs (For primary document see N80-33758 24-39)
Avail: Naval Research Lab., Attn. Code 5804, Washington, D.C. 20375. HC annual rate $100.00

Localized impact damage experiments of filament reinforced composite materials, the solution of wave propagation problems based on continuum mechanics models, and Hertzian contact approaches to impact problems are discussed.
R.K.G.

N80-33760 New South Wales Univ., Kensington (Australia). School of Electrical Engineering.
EQUIVALENCE TECHNIQUES FOR VIBRATION TESTING
H. S. Blanks *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 12, No. 8 Aug. 1980 p 13-23 refs (For primary document see N80-33758 24-39)
Avail: Naval Research Lab., Attn. Code 5804, Washington, D.C. 20375. HC annual rate $100.00

Techniques relevant to the equivalence between vibration tests and service vibration experience is given. Fatigue was the predominant failure mechanism considered in the vibration literature; useful equivalence techniques were developed. With regard to wear-out and equipment malfunction the situation is much less satisfactory. A technique that produces equivalence with respect to one failure mechanism will probably not provide equivalance for another.
R.K.G.

N80-33761 Rutgers - The State Univ., New Brunswick, N. J.
THEORETICAL AND NUMERICAL ANALYSES OF ANELASTIC MATERIALS AT FINITE STRAIN Ph.D. Thesis
Jehuda Rosenberg 1980 179 p
Avail: Univ. Microfilms Order No. 8022584

A group of materials for which the stress is a function of the current strain and strain rate is discussed. The simplest example of this type of material can be modeled by the linear Kelvin model. The stress-strain diagram of a Kelvin model subject to constant rate-of-strain loading is composed of parallel lines corresponding to different strain rates. Such a description does not correspond to the characteristic behavior of solids. For rubber materials the elastic modulus, increases with the increasing rate of deformation with lower and upper bounds. This phenomena is attributed to internal friction. Several constitutive formulations capable of describing the above mentioned phenomena are reviewed. A three dimensional constitutive relation based on Coleman and Mizel thermodynamic theory is proposed. In such a formulation, the stress is divided into reversible and dissipative components. The reversible component is defined to be the stress when the rate of strain approaches zero. It is shown that the reversible stress should be derivable from some strain energy function. Thus, the reversible stress is a hyperelastic stress. For the formulation of the reversible stress, several strain energy functions are considered including the Mooney-Rivlin energy function and a modified version of Shinozuka and Freudenthal energy function proposed by Bodner and Partom. Also, several dissipative stress formulations are considered.
Dissert. Abstr.

N80-33762 George Washington Univ., Washington, D.C.
AN ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF BIAXIAL LOADING EFFECTS ON CRACKS EMANATING FROM A CIRCULAR HOLE Ph.D. Thesis
Michael Kayode Oladimeji 1980 188 p
Avail: Univ. Microfilms Order No. 8016969

An investigation comprising a finite element analysis, a photoelastic verification and a series of four fracture tests on 7075-T6 aluminum was performed to examine the effects of biaxially applied loads on cracks emanating from a circular hole. For the finite element analysis the specimen was divided into two regions: (1) a small region around the crack tip where a 2 term Williams' analysis was employed and (2) the remainder of the specimen where a finite element analysis was employed. The displacements obtained from the 2 term Williams' series at the nodal points along the interface between the two regions were matched with the finite element displacements to form equations of displacement continuity across this interface. The resulting continuity expressions contain three unknown parameters, namely the stress intensity factor K1, the nonsingular A term associated with the modified Westergaard stress function and the constant term B associated with the crack-tip displacement in the horizontal direction. The three parameters are then obtained by the method of least squares.
Dissert. Abstr.

N80-33763 Texas Univ. at Austin.
NUMERICAL ANALYSIS OF EQUILIBRIUM PROBLEMS IN INCOMPRESSIBLE NONLINEAR ELASTICITY Ph.D. Thesis
Patrick Georges LeTallec 1980 189 p
Avail: Univ. Microfilms Order No. 8021465

The problem of equilibrium of incompressible hyperelastic bodies subjected to large strains is considered. Three different formulations are proposed. First, minimization of the potential energy on an admissible set. Second, a study of the weak equations of equilibrium is given. The last formulation considers the motion of the body and its gradient as two independent variables, related by a linear constraint treated by augmented Lagrangian techniques. An existence theory for these problems is discussed and theorems on the equivalence between these formulations are given. Approximations of these problems are presented for which solutions are proved to exist. A numerical scheme based on the Lagrangian formulation is developed. The results of several numerical experiments are given which indicate that the methods developed are quite effective for problems of this type.
Dissert. Abstr.

N80-33764 Illinois Univ. at Chicago Circle, Chicago.
THE TWISTING AND STRETCHING OF A NONLINEAR ANNULUS INCLUDING THE EFFECT OF WRINKLING Ph.D. Thesis
Thomas Rivers Canfield 1980 95 p
Avail: Univ. Microfilms Order No. 8023235

The appearance of wrinkles on a thin membrane surface is an indication of the inability of the membrane to carry compressive stresses. To study the wrinkling phenomenon, the assumption that the principal membrane stresses are either tensile or zero is usually made, and the theory derived from such an assumption is the so-called tension field theory. It has been formulated and studied quite thoroughly by several authors, but mostly in the context of linear plane-stress theory. Our formulation is based upon the well-established finite plane-stress theory. The kinematics necessitated by the presence of wrinkles is considered via the introduction of a wrinkle strain tensor which gives a measure of the wrinkliness of a wrinkled surface. All the field equations are systematically derived. In particular, equations of equilibrium in terms of the true (first) Piola-Kirchoff stresses are employed. The theory is applied to the problem of twisting and stretching of an annular membrane. It is shown that for this problem the system of equations can be reduced to quadratures.
Dissert. Abstr.

N80-33765 Ohio State Univ., Columbus.
THE CHARACTERIZATION OF THE CRACK GROWTH BEHAVIOUR OF ALLOY IN-100 AT ELEVATED TEMPERATURE UNDER SUSTAINED LOAD Ph.D. Thesis

Robert Charles Donat 1980 362 p
Avail: Univ. Microfilms Order No. 8022259

Sustained load track growth in IN-100 at 1350 F (732 C) is studied using two specimen geometries: a standard compact tension specimen and a radially cracked ring loaded in tension. The effects of specimen thickness on the growth rate are investigated covering a range from 0.22 inch (5.6 mm) to 0.72 inch (18.3 mm) in thickness. Only the thinnest specimens show a crack growth rate which is lower than that obtained from all of the other thickness specimens. Stress intensity factor, net section stress, load line displacement rate and the C integral are investigated as possible crack growth rate correlating parameters. In addition, a crack driving force function is developed for a linear elastic creeping solid which represents the excess of energy available for creating new crack surfaces. In particular, the crack growth rate is observed to decrease from an initially higher value to a steady state rate which depends on the stress intensity factor, net section stress or load line displacement rate. In the correlation of the stress intensity factor, the magnitude of this initial growth rate is about double the steady state creep crack growth rate. Dissert. Abstr.

N80-33766 Cornell Univ., Ithaca, N. Y.
EFFECT OF SURFACE ELLIPTICITY ON DYNAMICALLY LOADED SPHERICAL AND CYLINDRICAL JOINTS AND BEARINGS Ph.D. Thesis
Pawan Kumar Goenka 1980 193 p
Avail: Univ. Microfilms Order No. 8020823

The finite element formulation for regular spherical and cylindrical bearings is extended to include irregular (nonspherical and noncylindrical) bearing surfaces. The formulation is limited to planar loads and displacements. The optimum bearing shape for a cylindrical bearing is sought for a specific duty cycle with a constant load and sinusoidal angular displacement. The optimization is done with a view to maximizing the minimum film thickness. The optimum shape (found only among elliptical irregularities) for a one dimensional cylindrical bearing is found to have a circular journal and an elliptical sleeve. For this optimum bearing the absolute minimum film thickness is about a factor of 36 higher as compared to the regular (cylindrical) bearing. The absolute maximum pressure for this optimum bearing is about a factor of 5 lower than that for the regular bearing. A similar performance improvement was found for an irregular spherical bearing over a regular spherical bearing. For both spherical and cylindrical bearings some example problems were solved with forces and angular displacements found in hip joints as duty data. Dissert. Abstr.

N80-33767 Cornell Univ., Ithaca, N. Y.
DESIGN FOR THE PREVENTION OF PROGRESSIVE COLLAPSE USING INTERACTIVE COMPUTER GRAPHICS Ph.D. Thesis
John Lewis Gross, III 1980 195 p
Avail: Univ. Microfilms Order No. 8020822

Accurate analytical techniques for simulating the actual behavior of structures up to and through collapse are described. The nonlinear analysis of elastoplastic planar frame structures subjected to nonproportional static joint loads is discussed. A computer program is described for the analysis of frame structures including beam-column action and the effects of shear walls and beam to column connections. Special attention is given to the material and geometric nonlinear effects that become important in the evaluation of structures in the damaged state. Interactive computer graphics are found to play an important part in generating the required structure data, monitoring the progress of an analysis and interpreting the results. Several examples which illustrate the use of the progressive collapse analysis system are presented. Dissert. Abstr.

N80-33768 Cornell Univ., Ithaca, N. Y.
THREE-DIMENSIONAL FINITE ELEMENT ANALYSIS OF CYCLIC FATIGUE CRACK GROWTH OF MULTIPLE SURFACE FLAWS Ph.D. Thesis
Corneliu Manu 1980 239 p
Avail: Univ. Microfilms Order No. 8020849

A numerical tool capable of dealing with interacting multiple surface flaws in a plate subjected to cyclic loading was studied. A consistent method for computing stress intensity factors from three dimensional quarter point element nodal displacement is presented. The method is generalized to permit a functional evaluation of stress intensity factors along the crack front. Embedded and surface crack problems are solved using the proposed technique. It was concluded in the experimental work that interacting multiple surface flaws in a plate subjected to cyclic loading accelerate the crack growth, leading to earlier breakthrough of the plate than in the case of a single surface flaw. The good agreement between the numerical result of the present work with the experimental result shows that through efficient three dimensional finite element analysis a good prediction of breakthrough life of a plate with interacting surface flaws subjected to cyclic loading can be obtained. Dissert. Abstr.

N80-33769 Georgia Inst. of Tech., Atlanta.
GENERAL NONLINEAR COMPUTER ANALYSIS OF FRAMED STRUCTURES Ph.D. Thesis
Michael Harry Swanger 1980 394 p
Avail: Univ. Microfilms Order No. 8023766

A member model is proposed which permits a description of both nonlinear geometric behavior and nonlinear material behavior (i.e., metal yielding) in three dimensional structural frame members. A member is characterized as an assembly of an arbitary number of beam column segments, each of which is represented as a finite element with six translational degrees of freedom and six rotational degrees of freedom. The beam column segment itself is idealized as a bundle of slender prismatic fibers which permits a relatively simple and straightforward description of the complex relationships between geometry, displacement, and material behavior associated with the general nonlinear frame analysis problem. A total frame analysis procedure is also included, which is basically a tangent stiffness method characterized by load incrementation and Newton-Raphson equilibrium iteration. Dissert. Abstr.

N80-33770 Colorado State Univ., Fort Collins.
FINITE ELEMENT ANALYSIS FOR ELASTO VISCO-PLASTIC MATERIALS Ph.D. Thesis
Yoji Shimazaki 1980 80 p
Avail: Univ. Microfilms Order No. 8022422

Solutions to the equations for steady state creeping elasto viscoplastic (Maxwell fluid) flow were investigated. As a simple but nontrivial example, a one dimensional radial flow problem was solved with particular attention being paid to the effects of the boundary conditions. A one dimensional finite element algorithm was developed for this problem. For use over a wide range of applications the same algorithm was used to develop a program for the analysis of two dimensional flows. This program includes an efficient method for the LDU decomposition of both symmetric and nonsymmetric matrices. The analysis of elastic strain rates effects during slab rolling was investigated as an example of the applicability of the two dimensional program. Dissert. Abstr.

N80-33771 Rutgers - The State Univ., New Brunswick, N. J.
A STUDY OF THE MAGNITUDE AND DISTRIBUTION OF THE STRESSES IN THE END-BLOCK OF A POST-TENSIONED PRESTRESSED CONCRETE BEAM Ph.D. Thesis
Christopher Benedict Komna Gadegbeku 1980 223 p
Avail: Univ. Microfilms Order No. 8022560

The problem of the effects of high concentration of stresses in the anchorage zone of a post tensioned prestressed concrete beam was investigated. The problem was idealized as that of the stress distribution due to the application of a circular concentrated load acting at one end of a circular cylinder. The theoretical analysis and experimental procedure that followed were simplified. The measurement of both surface and interior strains was carried out. The strains were converted into stresses using two and three dimensional stress-strain relationships. The results shown that the stresses in the end block are indeed three dimensional. Graphs for specific loading conditions show stress configurations which are in good agreement with those predicted by the approximate solutions. Dissert. Abstr.

N80-33772 Princeton Univ., N. J.
TIME SERIES ANALYSIS OF WIND LOADINGS ON HYPERBOLIC COOLING TOWERS Ph.D. Thesis

Dorothy Aubrey Reed 1980 251 p
Avail: Univ. Microfilms Order No. 8023833

Time series methods are used to characterize certain wind data collect on a hyperbolic cooling tower. The data consist of eleven time series of wind pressure-differences recorded around the circumference of a hyperbolic cooling tower and a set of wind velocities recorded by an anemometer located at the top of the tower. Transfer function models in both the frequency and time domains relating input wind velocity to output wind pressure-difference are obtained for the following three positions around the tower: windward, approximately 100 degrees from windward, and rear. Time series parameters for existing longitudinal, lateral, and vertical fluctuating velocity spectra are obtained. Relationships between the cross-spectra of the pressure-difference and velocity are obtained from the transfer function models. Dissert. Abstr.

N80-33773 Texas Univ. at Austin.
IMPACT FORCE PREDICTION USING MEASURED FREQUENCY RESPONSE FUNCTIONS Ph.D. Thesis
Richard Joe Thornhill 1980 186 p
Avail: Univ. Microfilms Order No. 8021521

A method for impact force prediction using measured frequency response functions is investigated. The class of problems considered are those for which a mass, modeled as an ideal mass, experiences an elastic collision with a stationary structure. It is shown that a frequency response function measured at the point of collision on the structure together with the impactor's mass and velocity can be used to form a function which, after inverse Fourier transformation, is the impact force prediction. Nondimensionalized discrete models are examined to provide physical insight for applying the technique to real systems. Next the digital data processing phenomenon of time aliasing is examined and then a generalized spectral window is developed so that the technique can be used with a minicomputer which cannot perform a FFT having a large number of data points. Both predicted and measured impact forces are presented for a steel missile impacting a simple supported beam and an aluminum casting. A comparison of predicted to measured impact forces indicates that if the physical nonlinear contact stiffness is modeled as an ideal spring very good predictions are possible in terms of pulse duration and time-to-peak force. Dissert. Abstr.

N80-33774 Texas Univ. at Austin.
BEHAVIOR CLASSIFICATION OF SHORT REINFORCED CONCRETE COLUMNS SUBJECTED TO CYCLIC DEFORMATIONS Ph.D. Thesis
Kyle Andrew Woodward 1980 352 p
Avail: Univ. Microfilms Order No. 8021530

The behavior of reinforced concrete columns subjected to cyclic reversed deformations was studied. An experimental investigation (eleven tests), and the results of tests conducted elsewhere formed the basis for the development of a guide for classifying and predicting the behavior of columns subjected to load reversals. The eleven columns tested had one end translated bilaterally with respect to the other. Both ends were rotationally restrained. The columns were cyclically deflected along first one diagonal and then the other introducing bilateral forces onto the column. The condition of loading the specimen along two orthogonal axes made these tests unique and the first on short columns in which the amounts of longitudinal and transverse reinforcement were varied. The variation of longitudinal and transverse reinforcement, axial load, and loading history provided a test series in which a wide range of column behaviors were observed. The wide range of behavior provided a basic understanding of column response from which other test results could be evaluated. Dissert. Abstr.

N80-33775 Wayne State Univ., Detroit, Mich.
NONSTATIONARY RANDOM RESPONSE OF STRUCTURAL SYSTEMS TO AERODYNAMIC WIND FORCES Ph.D. Thesis
Harmahendar Singh 1980 114 p
Avail: Univ. Microfilms Order No. 8022791

Second order statistics of system response to unsteady aerodynamic wind forces of limited time duration are studied. Characteristics of severe climatic conditions are represented by modeling the wind velocity field as a time modulated nonstationary process. The theory of energy spectral density is described in formulating transient response of a simple system in nonstationary wind forces. The effect of the inertia force term, system characteristics and the parameters describing the wind field in system response is studied by parametric plots. The study indicates that the transient mean square response varies significantly from its steady state value for storms of relatively short span. Application of the nonstationary theory and minimization of system response over a constraint set of system design parameters are illustrated through a numerical example. Dissert. Abstr.

N80-33776 Texas Technological Univ., Lubbock.
GEOMETRICALLY NONLINEAR ANALYSIS OF RECTANGULAR GLASS PANELS BY THE FINITE ELEMENT METHOD Ph.D. Thesis
Abdul-Hamid Judi Al-Tayyib 1980 161 p
Avail: Univ. Microfilms Order No. 8022607

A refined finite element model is developed for the stress analysis of geometrically nonlinear, simply supported, uniformly loaded, rectangular glass plates. The need for such a model was prompted from failure of large rectangular glass panels installed in windows and exterior walls of modern high rise buildings subjected to high wind loadings. The acutal framing configurations of these glass panels allow the boundary edges to move in the plane of the plate with little restraint. When the loads become large, membrane behavior plays a significant role in changing the overall behavior of the glass plate. Numerical studies conducted on the glass plate problem revealed that the convergence of stresses to exact values differs between bending and membrane stresses, and depends on the fineness of the finite element discretization, the location within the plate, and the relative magnitude of the loading increment. This observation is valuable for analyzing geometrically nonlinear thin plate problems. Dissert. Abstr.

N80-33777*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
STABILITY OF NONUNIFORM ROTOR BLADES IN HOVER USING A MIXED FORMULATION
Wendell B. Stephens (Army Research and Technology Labs., Moffett Field, Calif.), Dewey H. Hodges (Army Rsearch and Technology Labs., Moffett Field, Calif.), John H. Avila (Technology Development of California, Santa Clara), and Ru-Mei Kung (Technology Development of California, Santa Clara) Aug. 1980 23 p refs Presented at the 6th European Rotorcraft and Powered Lift Aircraft Forum, Bristol, England, 16-19 Sep. 1980
(NASA-TM-81226; A-8314; AVRADCOM-TR-80-A-10; Paper-13) Avail: NTIS HC A02/MF A01 CSCL 01C

A mixed formulation for calculating static equilibrium and stability eigenvalues of nonuniform rotor blades in hover is presented. The static equilibrium equations are nonlinear and are solved by an accurate and efficient collocation method. The linearized perturbation equations are solved by a one step, second order integration scheme. The numerical results correlate very well with published results from a nearly identical stability analysis based on a displacement formulation. Slight differences in the results are traced to terms in the equations that relate moments to derivatives of rotations. With the present ordering scheme, in which terms of the order of squares of rotations are neglected with respect to unity, it is not possible to achieve completely equivalent models based on mixed and displacement formulations. The one step methods reveal that a second order Taylor expansion is necessary to achieve good convergence for nonuniform rotating blades. Numerical results for a hypothetical nonuniform blade, including the nonlinear static equilibrium solution, were obtained with no more effort or computer time than that required for a uniform blade. Author

N80-33778*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTI-PARAMETER YIELD ZONE FOR PREDICTING SPECTRUM CRACK GROWTH
W. S. Johnson Sep. 1980 36 p refs Submitted for publication
(NASA-TM-81890) Avail: NTIS HC A03/MF A01 CSCL 20K

A systematic technique is presented for modeling crack growth load interaction effects due to spectrum loading. The Multi-

Parameter Yield Zone (MPYZ) model accounts for crack growth retardation, acceleration, and underload effects. The load interactions are attributed to the residual stress intensity due to the plastic deformation at the crack tip. Fatigue crack growth was predicted and compared with test data for a variety of spectrum loadings. Author

N80-33779# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
STRESS GRADIENTS AROUND NOTCHES
J. Schijve Apr. 1980 58 p
(LR-297; ICAF-1160) Avail: NTIS HC A04/MF A01

Stress gradients at the root of a notch are significant for the notch effect and the size effect on fatigue properties. Usually the gradient of the stress distribution in the minimum section is considered. In the variation of the tensile stress along the edge of the notch is considered. Calculations are made for a variety of notches. The results indicate a remarkable conformity of stress distributions at the notch root if the same peak stress and notch root radius apply. Consequently the stress concentration factor and the notch root radius are highly characteristic for the stress distribution around the notch. Along the edge of the notch the stress decreases at a much slower rate than in the minimum section going away from the material surface. For the stress along the edge of the notch a stress gradient coefficient is defined. The variation of this coefficient is fairly small for several notches and stress concentration factor values. A 5 percent lower stress as compared to the peak stress at the notch root is obtained at about 0.02 notch root radius below the material surface and at a distance of about 0.18 notch root radius to the critical point along the material surface. Author

N80-33780# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
SOME FORMULAS FOR THE CRACK OPENING STRESS LEVEL
J. Schijve Apr. 1980 12 p refs
(M-368; ICAF-1161) Avail: NTIS HC A02/MF A01

Crack growth data for 2024-T3 sheet material were analyzed with different formulas for delta K sub eff as a function of the stress ratio R. The data covered R values from - 1.0 to 0.54. T.M.

N80-33781# Aeronautical Research Labs., Melbourne (Australia).
A ONE-PASS METHOD FOR COUNTING RANGE MEAN PAIR CYCLE FOR FATIGUE ANALYSIS
R. C. Fraser Jun. 1979 34 p refs
(ARL-Struc-Note-454; AR-001-746) Avail: NTIS HC A03/MF A01

A one pass method for counting Range Mean Pair cycles is described. The Range Mean Pair Table which was used to represent the data generated by the method was considered with reference to its use in fatigue analysis. T.M.

N80-33782*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
NINTH NASTRAN USERS' COLLOQUIUM
Oct. 1980 248 p refs Colloq. held in Cocoa Beach, Fla., 22-23 Oct. 1980
(NASA-CP-2151) Avail: NTIS HC A11/MF A01 CSCL 20K

The general application of finite element methodology and the specific application of NASTRAN to a wide variety of static and dynamic structural problems is addressed. Comparison with other approaches and new methods of analysis with nastran are included. For individual titles, see N80-33783 through N80-33795.

N80-33783*# Naval Ship Research and Development Center, Bethesda, Md.
NEW CAPACITIES AND MODIFICATIONS FOR NASTRAN LEVEL 17.5 AT DTNSRDC
Myles M. Hurwitz *In* NASA. John F. Kennedy Space Center 9th NASTRAN Users' Colloq. Oct. 1980 p 1-13 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

Since 1970 DTNSRDC has been modifying NASTRAN to suite various Navy requirements. These modifications include capabilities as well as user conveniences and error corrections. The new features added to NASTRAN Level 17.5 are described. The subject areas of the additions include magnetostatics, piezoelectricity, fluid structure interactions, isoparametric finite elements, and shock design for shipboard equipment. A.R.H.

N80-33784*# Hitachi Ltd., Tokyo (Japan).
IMPROVEMENTS IN SPARSE MATRIX OPERATIONS OF NASTRAN
Shinichiro Harano *In* NASA. John F. Kennedy Space Center 9th NASTRAN Users' Colloq. Oct. 1980 p 14-48 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

A 'nontransmit' packing routine was added to NASTRAN to allow matrix data to be refered to directly from the input/output buffer. Use of the packing routine permits various routines for matrix handling to perform a direct reference to the input/output buffer if data addresses have once been received. The packing routine offers a buffer by buffer backspace feature for efficient backspacing in sequential access. Unlike a conventional backspacing that needs twice back record for a single read of one record (one column), this feature omits overlapping of READ operation and back record. It eliminates the necessity of writing, in decomposition of a symmetric matrix, of a portion of the matrix to its upper triangular matrix from the last to the first columns of the symmetric matrix, thus saving time for generating the upper triangular matrix. Only a lower triangular matrix must be written onto the secondary storage device, bringing 10 to 30% reduction in use of the disk space of the storage device. A.R.H.

N80-33785*# Naval Underwater Systems Center, New London, Conn.
SOLUTION SENSITIVITY AND ACCURACY STUDY OF NASTRAN FOR LARGE DYNAMIC PROBLEMS INVOLVING STRUCTURAL DAMPING
A. J. Kalinowski *In* NASA. John F. Kennedy Space Center 9th NASTRAN Users' Colloq. Oct. 1980 p 49-62 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

Large dynamic problems involving NASTRAN SOLUTION 8 (i.e., the steady state dynamic response option wherein all response quantities vary as e sub i omega t, where omega is the driving frequency and t is time) are considered. Using a submerged steel plate with a viscoelastic layer layer as the bench mark sample, the solution sensitivity and solution accuracy are checked. The solution sensitivity is examined by running the same finite element model on different computers, different versions of NASTRAN, and different precision levels. The solution accuracy is evaluated for these same runs by comparing the NASTRAN results with the exact solution of the same problem. A.R.H.

N80-33786*# Naval Underwater Systems Center, New London, Conn.
RING ELEMENT DYNAMIC STRESSES
Nancy Lambert (Smith (A. O.) Engineering Systems) and Michael Tucchio *In* NASA. John F. Kennedy Space Center 9th NASTRAN Users' Colloq. Oct. 1980 p 63-78 ref (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

The stresses in the CTRAPRG and CTRIARG ring elements are not calculated for any of the dynamic solutions in the current COSMIC version of NASTRAN. A DMAP alter sequence for Solution 8 and post-processing program, NASTPOST, are presented to calculate these stresses. Test cases are used which describe the method. The stiffness and the consistent versus concentrated mass problems ascribed to this element are reviewed. The DMAP alter sequence introduces Solution 8 displacements to a Solution 1 module to calculate real and imaginary stress components during the execution of Solution 8. The post-processor, NASTPOST, calculates the magnitude/phase stress results. The DMAP sequence was written specifically for level 52 MSC/NASTRAN, but can certainly be used for any COSMIC version with slight modification. A.R.H.

N80-33787*# Institut de Recherche de l'Hydro-Ontario. Civil Design Dept.
AN ENHANCEMENT OF NASTRAN FOR THE SEISMIC ANALYSIS OF STRUCTURES
John W. Burroughs *In* NASA. John F. Kennedy Space Center

9th NASTRAN Users' Colloq. Oct. 1980 p 79-95 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

New modules, bulk data cards and DMAP sequence were added to NASTRAN to aid in the seismic analysis of nuclear power plant structures. These allow input consisting of acceleration time histories and result in the generation of acceleration floor response spectra. The resulting system contains numerous user convenience features, as well as being reasonably efficient.
Author

N80-33788*# NKF Engineering Associates, Inc., Vienna, Va. Engineering Mechanics Div.
SOLUTION OF ENFORCED BOUNDARY MOTION IN DIRECT TRANSIENT AND HARMONIC PROBLEMS
Gary L. Fox *In* NASA. John F. Kennedy Space Center 9th NASTRAN Users' Colloq. Oct. 1980 p 96-120 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

The current versions of NASTRAN, i.e., NASA, MSC, and MAC support nonzero boundary displacements only in the static analysis. Forcing functions in the dynamic analysis formats allow only forces and pressures to exercise the mathematical model. A DMAP alter sequence to circumvent this limitation is described. For the direct harmonic problem, a simple change to module FRRD is incorporated to effect a more efficient use of the code.
J.M.S.

N80-33789*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON THE APPLICATION OF NONLINEAR LOAD ELEMENTS TO THERMAL ANALYSES USING THE NASTRAN THERMAL ANALYZER
Hwa-Ping Lee *In* NASA. John F. Kennedy Space Center 9th NASTRAN Users' Colloq. Oct. 1980 p 121-139 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

The nonlinear load elements in thermal analysis are used to simulate an undocumented nonlinear thermal boundary condition. The treatment of the nonlinearity arising from the temperature-dependent convective film coefficients is shown in detail. As an illustration, emphasis is placed on the modeling techniques and their interrelationships with the solution accuracy as affected by a specific integration algorithm of the transient thermal analysis used in the NASTRAN Thermal Analyzer. Briefly shown is the underlying theory on which the maneuvering of terms pertinent to the modeling depends. This demonstration provides some insight into the intricacies of the method that would be general to all applications. A recommendation is also made to modify a nonlinear load element that will enhance the solution capability and broaden the scope of application.
J.M.S.

N80-33790*# Tennessee Eastman Corp., Oak Ridge.
NASTRAN ANALYSIS OF HEAT-TRANSFER FLUID FILL PIPE FAILURE
J. Ronald Winter *In* NASA. John F. Kennedy Space Center 9th NASTRAN Users' Colloq. Oct. 1980 p 140-160 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

An example that shows the difficulties of failure analyses and the advantage of the finite element method (NASTRAN) in assisting in determining the true cause of a failure is presented. In this example, cracks were developing along a pipe weld. After discarding several possible causes for the failures, it was finally determined that the problem was due to stress corrosion cracking associated with a rather unusual and novel environmental condition.
J.M.S.

N80-33791*# Ballistic Research Labs., Aberdeen Proving Ground, Md.
A NASTRAN INVESTIGATION OF SIMULATED PROJECTILE DAMAGE EFFECTS ON A UH-1B TAIL BOOM MODEL
Arnold T. Futterer *In* NASA. John F. Kennedy Space Center 9th NASTRAN Users' Colloq. Oct. 1980 p 161-172 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

A NASTRAN model of a UH-1B tail boom that had been designed for another project was used to investigate the effect on structural integrity of simulated projectile damage. Elements representing skin, and sections of stringers, longerons and bulkheads were systematically deleted to represent projectile damage. The structure was loaded in a manner to represent the flight loads that would be imposed on the tail boom at a 130 knot cruise. The deflection of four points on the rear of the tail boom relative to the position of these points for the unloaded, undamaged condition of the tail boom was used as a measure of the loss of structural rigidity. The same procedure was then used with the material properties of the aluminum alloys replaced with the material properties of T300/5208 high strength graphite/epoxy fibrous composite material, (0, + or - 45, 90)s for the skin and (0, + or - 45)s for the longerons, stringers, and bulk heads.
J.M.S.

N80-33792*# International Business Machines Corp., Rochester, Minn. General Systems Div.
FINITE CIRCULAR PLATE ON ELASTIC FOUNDATION CENTRALLY LOADED BY RIGID SPHERICAL INDENTER
S. K. Wadhwa and P. P. Yang *In* NASA. John F. Kennedy Space Center 9th NASTRAN Users' Colloq. Oct. 1980 p 173-190 *ref* (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

The analytical solution of a finite circular plate on an elastic foundation centrally loaded by the rigid indenter is discussed. The procedure to use NASTRAN as a subroutine to iteratively converge to this solution numerically is described.
J.M.S.

N80-33793*# Army Armament Research and Development Command, Watervliet, N. Y.
ELASTIC-PLASTIC ANALYSIS USING A TRIANGULAR RING ELEMENT IN NASTRAN
P. C. T. Chen *In* NASA. John F. Kennedy Space Center 9th NASTRAN User's Colloq. Oct. 1980 p 190-200 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

An elastic plastic triangular ring element is implemented in NASTRAN computer program. The plane strain problem of partially plastic thick walled cylinder under internal pressure is solved and compared with the earlier finite difference solution. A very good agreement has been reached. In order to demonstrate its application to more general problems, an overloaded thread problem for the British Standard Buttress is examined. The maximum axial and principal stresses are located and their values are determined as functions of loadings.
Author

N80-33794*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
DEVELOPMENT AND ANALYSIS OF THE LEARJET 54/55 FUSELAGE NASTRAN MODEL USING SUBSTRUCTURE TECHNIQUES
Robert R. Boroughs, Sivam Paramasivam, and Joanna Werner *In its* 9th NASTRAN User's Colloq. Oct. 1980 p 201-223 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

Development and analysis of the Learjet 54/55 fuselage NASTRAN model is presented. This structure was broken down into several substructures to make the modeling and analysis effort more manageable. Since the geometry was fairly complex in some areas and in order to provide flexibility for future configuration studies, a series of local coordinate systems were used to describe the model. This work was accomplished using several different computer systems, the more recent of which were connected by a high speed data communications lines to perform the tasks of model generation and NASTRAN analysis.
J.M.S.

N80-33795*# Naval Ship Research and Development Center, Bethesda, Md.
COMPARISON OF FINITE ELEMENT ANALYSIS OF A PIPING TEE USING NASTRAN AND CORTES/SA
Antonio J. Quezon and Gordon C. Everstine *In* NASA. John F. Kennedy Space Center 9th NASTRAN User's Colloq. Oct. 1980 p 224-242 refs (For primary document see N80-33782 24-39)
Avail: NTIS HC A11/MF A01 CSCL 20K

A comparison of finite element analyses of a piping tee was made using NASTRAN and CORTES/SA, a modified version of SAP3 having a special purpose input processor for generating

geometries for a wide variety of tee joints. Four finite element models were subjected in force, moment, and pressure loadings. Flexibility factors and principal stresses were computed for each model and compared with results obtained experimentally by Combustion Engineering, Inc. Results from the NASTRAN analyses were in good agreement with experimental results for all loadings except internal pressure. The CORTES/SA analyses gave good results for the internal pressure loading, but poorer results for out of plane bending moments or forces resulting in out of plane bending. Two of the basic load cases in CORTES/SA were found to contain errors that could not be easily corrected. COST COMPARison of NASTRAN and CORTES/SA showed NASTRAN to be less expensive to two than CORTES/SA for identical meshes. J.M.S.

N80-33796# Aeronautical Research Labs., Melbourne (Australia).
THE STRESS-WAVE RADIATION FROM GROWING CRACKS
L. R. F. Rose Aug. 1979 22 p refs
(ARL/Mat-Rept-112; AR-001-756) Avail: NTIS HC A02/MF A01

Formulas are given for the stress discontinuities radiated by a suddenly starting two dimensional crack under tension, in an ideal elastic body. These formulas also give, with a change in sign, the stress discontinuities radiated by a suddenly stopping crack, and, with a geometrical deformation, those radiated by a three dimensional crack. The stress in the primary radiation due to short crack jumps is shown to vary in the same manner as does the crack speed during the jump. The diffraction of the primary radiation from one tip of a center crack by the other tip produces a secondary radiation, whose properties depend mainly on the nature of the surface wave associated with the primary radiation. This first diffraction can lead to crack extension. If it is possible to isolate the primary radiation experimentally, it should give the essential characteristics of the source. This could be used to separate source characteristics from specimen and transducers effects in acoustic emission studies of fatigue cracking or stress corrosion cracking. S.F.

N80-33797# Aeronautical Research Labs., Melbourne (Australia).
A CRACK OPENING DISPLACEMENT APPROACH TO CRACK PATCHING
R. Jones and R. J. Callinan Oct. 1979 13 p refs
(ARL/Struc-Note-455; AR-001-768) Avail: NTIS HC A02/MF A01

A correlation was observed between the reduction of the opening of a patched crack, at any point along the crack, and the reduction in the stress intensity factor due to patching. This raises the possibility of using crack opening displacement measurements as a measure of patch efficiency. The results of a numerical investigation into crack patching indicate that a modified form of the crack opening displacement approach may be useful in estimating the effect that fiber composite patches have on cracks in thin sheets. E.D.K.

N80-33798# Aeronautical Research Labs., Melbourne (Australia).
A DESIGN STUDY IN CRACK PATCHING
R. Jones and R. J. Callinan Jul. 1979 20 p
(ARL/Struc-Rept-376) Avail: NTIS HC A02/MF A01

A numerical investigation into the behavior of cracked sheets which are patched with an overlay of composite material, is presented. Guidelines as to the optimum location, size, and shape of patches are given. The main considerations are: reduction in the stress intensity factors at the crack tip, the maximum fiber stress in the patch and the maximum shear stress in the adhesive bond between patch and sheet. R.K.G.

N80-33799# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
BIREFRINGENT COATING TECHNIQUE, PHOTOELASTIC STRESS ANALYSIS
28 Aug. 1980 18 p
(AD-A088657; TOP-1-2-605) Avail: NTIS HC A02/MF A01 CSCL 11/3

This report describes the birefringent coating technique of photoelastic evaluation of surface stress. Included are test equipment and instrumentation, calibration tests, static and dynamic loading, and photographic requirements. GRA

N80-33800# California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
THE EQUILIBRIUM FIELD NEAR THE TIP OF A CRACK FOR FINITE PLANE STRAIN OF INCOMPRESSIBLE ELASTIC MATERIALS
Rodney A. Stephenson Jul. 1980 71 p refs
(Contract N00014-75-C-0196)
(AD-A088838; TR-44) Avail: NTIS HC A04/MF A01 CSCL 20/11

This investigation is concerned with the deformations and stresses in a slab of all-around infinite extent containing a traction-free plane crack, under conditions of plane strain. The analysis is carried out within the framework of the fully nonlinear equilibrium theory of homogeneous and isotropic incompressible elastic solids. For a fairly wide class of such materials and general loading conditions at infinity, asymptotic estimates appropriate to the various field quantities near the crack-tips are deduced. For a subclass of the materials considered, these results - in contrast to the analogous predictions of the linearized theory - lead to the conclusion that the crack opens up in the neighborhood of its tips even if the applied loading is antisymmetric about the plane of the crack, (e.g., Mode 2 loading). It is shown further that the nonlinear global crack problem corresponding to such a loading in general cannot admit an antisymmetric solution. GRA

N80-33801# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
EXPERIMENTAL INVESTIGATION OF THE CRACK GROWTH GAGE Final Report, Jan. 1978 - Nov. 1979
Donald R. Holloway Jun. 1980 100 p refs
(AF Proj. 2401)
(AD-A089137; AFWAL-TR-80-3045) Avail: NTIS HC A05/MF A01 CSCL 20/11

The objective of this program was to determine the feasibility of the crack growth gage as a more direct method for monitoring potential crack growth damage in fatigue critical areas of F-4 aircraft structure. The major task consisted on mounting crack growth gages on a full-scale F-4C/D fatigue test article and collecting crack growth data from the gages at specified intervals. Two additional tasks were comprised of (1) conducting a gage qualification test program in accordance with MIL-STD-810C (Environmental Test Method) requirements, and (2) determining an appropriate method for collecting data from the gage. Inconsistencies in constant amplitude test results and bonding problems encountered on the F-4C/D full-scale fatigue test article prevented the MIL-STD-810C qualification tests from being started. Results of this investigation indicated that further research and development of the crack growth gage concept is required before the gage can be recommended as a fleetwide tracking device. GRA

N80-33802# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mathematics.
ON THE DYNAMIC ENERGY RELEASE RATE IN ELASTIC CRACK PROPAGATION Interim Report
Morton E. Gurtin and Chikayoshi Yatomi Dec. 1979 36 p refs
(Grant AF-AFOSR-3013-76; AF Proj. 2307)
(AD-A089119; TR-14; AFOSR-80-0685TR) Avail: NTIS HC A03/MF A01 CSCL 20/11

It is the purpose of this paper to give a unified treatment of the dynamic energy release rate, E, for a sharp, straight crack in a hyperelastic body undergoing finite strain. As our main result we decompose E into the usual quasi-static energy release rate plus a nonpositive dynamic contribution; thus for a dynamic solution the energy release rate computed using the classical quasi-static formula is larger than the actual dynamic energy release rate. GRA

N80-33803# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mathematics.
ON IRWINS AND ACHENBACHS EXPRESSIONS FOR THE ENERGY RELEASE RATE
Chikayoshi Yatomi Dec. 1979 12 p refs
(Grant AF-AFOSR-3013-76; AF Proj. 2307)
(AD-A089118; TR-15; AFOSR-80-0686TR) Avail: NTIS HC A02/MF A01 CSCL 20/11

Using a constitutive equation and anti-plane shear field introduced by Knowles, we show that the expressions of Irwin and Achenbach for the energy release rate are not generally valid for nonlinear elastic materials. GRA

N80-33804# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mathematics.
THE EFFECT OF SURFACE ENERGY ON TEMPERATURE RISE AROUND A FAST RUNNING CRACK
Chikayoshi Yatomi 16 Jun. 1980 13 p refs
(Grant AF-AFOSR-3013-76; AF Proj. 2307)
(AD-A088756; TR-17; AFOSR-80-0684TR) Avail: NTIS HC A02/MF A01 CSCL 20/13

Using a local balance law developed by Gurtin for the cohesive zone, we give a system of equations governing the temperature rise around a fast running crack. We note that the effect of surface temperature cannot be neglected for a fast running crack, and we discuss the equations under simplifying assumptions. In particular, assuming that the surface temperature is much higher than the surrounding temperature, we arrive at a simple solution in closed form. This solution agrees with experimental results of Fuller, Fox, and Field for polymethyl methacrylate showing that the temperature rise at the crack tip is independent of crack speed. GRA

N80-33805# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mathematics.
NOTE ON THE ENERGY RELEASE RATE FOR A CRACK STARTING FROM THE APEX OF A WEDGE
Chikayoshi Yatomi 16 Jun. 1980 8 p refs
(Grant AF-AFOSR-3013-76; AF Proj. 2307)
(AD-A089116; TR-16; AFOSR-80-0681TR) Avail: NTIS HC A02/MF A01 CSCL 20/11

Griffith was apparently the first to employ the energy release rate 'G' as a critical condition of crack extension. In this note we will show, however, that if a crack starts from the apex of a wedge, the initial value of 'G' is zero, although the stresses at the crack tip are unbounded. This example suggests that you cannot use the initial energy release rate as a critical condition of crack extension unless the opening-angle of the crack faces in the reference is precisely zero. Since the order of the singularity of the strain energy density is less than one, this result may be predicted mathematically but it is not trivial physically. We confine our problem to a simple mode 2 crack; the given solutions are then simple and of closed-form so that we can examine the precise dependence of 'G' on the crack length a. To the author's knowledge, no such closed-form solutions for an arbitrary crack length a have been presented. GRA

N80-33806# State Univ. of New York at Buffalo. Dept. of Engineering Science.
ELASTIC PLATE VIBRATIONS BY BOUNDARY INTEGRAL EQUATIONS. PART 1: INFINITE PHASE
Richard Paul Shaw Jun. 1980 14 p
(Contract N00014-71-C-0108)
(AD-A089105; TR-10915) Avail: NTIS HC A02/MF A01 CSCL 20/11

One of the prime difficulties in developing two dimensional dynamic elastic plate theories from the three dimensional equations of elasticity is the choice of functional dependence on the thickness coordinate. This difficulty may be circumvented by formulating the problem first as a boundary integral equation; then the dependence on the independent variable through the plate thickness follows form as a direct quadrature with no assumptions of functional form required. In particular, the examination of separate symmetric and antisymmetric modes allows the boundary integral equation to be written with unknowns evaluated on a single surface. GRA

N80-33807# Naval Ship Research and Development Center, Bethesda, Md. Ship Materials Engineering Dept.
ANALYSIS OF RESIDUAL STRESSES RESULTING FROM COLD ROLLING OF NOTCHES AND THEIR EFFECT ON FATIGUE BEHAVIOR
M. G. Vassilaros Aug. 1980 41 p refs
(AD-A089110; DTNSRDC/SME-80/23) Avail: NTIS HC A03/MF A01 CSCL 13/8

The effects of cold forming on the fatigue behavior of threads were analyzed using slip-line field and finite element analyses. Bolt threads were simulated using notched rotating cantilever-beam fatigue specimens of Inconel 718. The slip-line fields for wedge indentations, with some modifications, were used to analyze the deformation process of notch rolling. Stresses on the deepest slip lines were used in an elastic finite element analysis of the internal stresses existing outside the slip-line field during deformation. Negatives of the loads on the notch surface from the indentor were used in a second elastic finite element analysis to determine the internal stresses resulting from unloading. These two stress analyses, with a correction for yielding, were employed to map the residual stress distribution around the rolled notch. The predicted residual stress distribution showed an intense compressive region below the notch root. This stress distribution was then used to rationalize the fatigue crack propagation behavior of Inconel 718 rotating cantilever-beam fatigue specimens with rolled and machined notches. J.M.S.

N80-33808# Lockheed Missiles and Space Co., Palo Alto, Calif.
INELASTIC RESPONSE OF AN INFINITE CYLINDRICAL SHELL TO A TRANSIENT ACOUSTIC WAVE Final Report, 1 Aug. 1977 - 31 Mar. 1979
T. L. Geers and C.-L. Yen Mar. 1979 43 p refs
(Contract N00014-77-C-0562; RR0230301)
(AD-A088597; LMSC-D676214) Avail: NTIS HC A03/MF A01 CSCL 20/11

An analytical/computational technique developed for determining the geometrically and constitutively nonlinear response of an infinite cylindrical shell to a transverse, transient acoustic wave is described. Shell behavior is treated through utilization of the nonlinear structural analyzer DYNAPLAS II, while the fluid structure interaction is treated in accordance with both the exact residual potential formulation and the doubly asymptotic approximation. Numerical results produced through application of the approximation differ significantly from the corresponding exact results. M.G.

N80-33809# National Technical Information Service, Springfield, Va.
MATHEMATICAL ANALYSIS OF STRESS CRACKS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1977 - Jun. 1980
Guy E. Habercom, Jr. Jul. 1980 146 p Supersedes NTIS/PS-79/0804; NTIS/PS-78/0768
(PB80-813447; NTIS/PS-79/0804; NTIS/PS-78/0768) HC $30.00/MF $30.00 CSCL 20K

Stress cracks are analyzed by mathematical methods, including extensive use of finite element analysis. Various materials, including metals, wood, composites, and rock are investigated. This updated bibliography contains 140 citations, 22 of which are new entries to the previous edition. GRA

N80-33810# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
STRESS INTENSITY DISTRIBUTIONS FOR NATURAL FLAW SHAPES APPROXIMATING BENCHMARK GEOMETRIES
C. W. Smith, W. H. Peters, G. C. Kirby, and A. Andonian (Illinois Univ., Chicago Circle) Feb. 1980 32 p refs Submitted for publication
(Contract NSF ENG-76-20824)
(PB80-200785; VPI-E-80-17) Avail: NTIS HC A03/MF A01 CSCL 20K

An experimental technique which couples the field equations of linear elastic fracture mechanics with the frozen stress photoelastic method for generating natural flaw shapes and their corresponding stress intensity distributions is described. The application of this technique to two surface flaw geometries approximating benchmark geometries is discussed and the results are compared with the recent literature in order to assess the validity of the semi-elliptic flaw shape assumption for the surface flaw in numerical models and to quantify any observed deviations. GRA

42 GEOSCIENCES (GENERAL)

N80-33811# World Meteorological Organization, Geneva (Switzerland).

OROGRAPHIC EFFECTS IN PLANETARY FLOWS Global Atmospheric Research Program

R. Hide, ed. and P. W. White, ed. Jun. 1980 280 p refs Prepared in cooperation with International Council of Scientific Unions, Rome (Italy)

(GARP-Publ-23) Avail: NTIS HC A12/MF A01; WMO, Geneva SWFR 40

Topics discussed include the influence of orography on atmospheric general circulation; planetary waves; orographically enhanced rain; mountain waves and momentum flux; modification of the boundary layer by orography; the effects of bottom topography on ocean currents; cyclogenesis in the lee of mountains and its modeling; laboratory studies of topographic effects in fluids; mesoscale orographic effects revealed by satellites; orographically controlled cross-equatorial flow; and orographic effects in the atmospheres of other planets. For individual titles, see N80-33812 through N80-33822.

N80-33812# National Center for Atmospheric Research, Boulder, Colo.

INFLUENCE OF OROGRAPHY ON THE ATMOSPHERIC GENERAL CIRCULATION c46

Akira Kasahara *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 1-49 Sponsored by NSF (For primary document see N80-33811 24-42)

Avail: NTIS HC A12/MF A01

Various effects of the large-scale mountain complexes on the atmospheric general circulation are reviewed. Based on the statistics of cyclogenesis in the Northern Hemisphere, evidence is presented concerning the orographic influence on large-scale motions. Theoretical and numerical studies of the influence of orography on atmospheric circulation are discussed by considering the dynamical and thermal factors individually and then their combined effect. Problems in prediction models discussed range from the representations of orographic effects of both large-scale and subgrid-scale to data analysis in the vicinity of mountains. Four prominent weather and climatological phenomena related to large-scale mountain complexes; the onset of the Southeast summer monsoon, tropospheric blocking processes, stratospheric sudden warmings, and lee cyclogeneses are described.

Author (ESA)

N80-33813# National Center for Atmospheric Research, Boulder, Colo.

PLANETARY WAVES: THEORY AND OBSERVATION c46

Robert E. Dickinson *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 51-84 refs (For primary document see N80-33811 24-42)

Avail: NTIS HC A12/MF A01

The dynamics of planetary waves and their observational characteristics are reviewed and the tropospheric sources of these waves are summarized. The characteristic structures to be expected for waves excited by different sources are explained by means of linear perturbation theory. It is shown that improved understanding of planetary waves in general will require improved understanding of the long-term monthly mean stationary waves in the troposphere. Between hemispheres, there are remarkable differences of the Fourier longitudinal wavenumber one and seasons that are poorly understood. The orographic and diabatic forcing terms for planetary waves are examined. It is pointed out that thermal infrared radiation is likely important for planetary wave structure. The response to orography of barotropic and continuously stratified planetary wave models is discussed. Besides exhibiting different dependences on wavenumber, the two models are very different in their sensitivity to Ekman friction.

Author (ESA)

N80-33814# Royal Signals and Radar Establishment, Malvern (England). Meteorological Office Radar Research Lab.

STRUCTURE, MECHANISM AND PREDICTION OF OROGRAPHICALLY ENHANCED RAIN IN BRITAIN c47

K. A. Browning *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 85-114 refs revised (For primary document see N80-33811 24-42)

Avail: NTIS HC A12/MF A01

The horizontal distribution and vertical structure of orographic rain are discussed. It is shown that orographic rain is difficult to measure by means of raingage networksor by radar. The observational evidence reviewed supports the widespread applicability of a conceptual model by Bergerson, according to which small droplets in a low level orographic 'feeder cloud' located mainly below the 0 C level are washed out by raindrops falling from a pre-existing 'seeder cloud'. A numerical treatment of the washout process provides a sound basis for deriving dynamically simple models for predicting the distribution of orographic rain. Such models can be driven by the output from large scale dynamical models capable of predicting the background conditions in the absence of detailed orography. A test of one such combination of models shows good skill in predicting 24 h rainfall accumulations over hills. To predict the time variation in the period 0 to 6 h ahead, it is necessary to supplement the numerical models by radar observations of precipitation patterns upwind of the forecast area.

Author (ESA)

N80-33815# National Center for Atmospheric Research, Boulder, Colo.

MOUNTAIN WAVES AND MOMENTUM FLUX c47

J. B. Klemp and D. K. Lilly *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 115-141 (For primary document see N80-33811 24-42)

Avail: NTIS HC A12/MF A01

Mountain wave scales which produce the primary contributions to the momentum flux are those large enough so nonhydrostatic effects are not dominant, and small enough that rotation does not dominate. The properties of the linear equations are described with appropriate simplifications, and a classification of mountain waves is presented, based on horizontal scale. The validity and limitations of hydrostatic irrotational mountain wave theory are treated. Factors influencing hydrostatic irrotational mountain wave amplitude and associated momentum transport examined include the effect of vertical variations in mean state, terrain shape and height. Results from instrumented aircraft flights over the Rocky Mountains in Colorado, including data from the wave momentum flux experiment (WAMFLEX), are compared with theory.

Author (ESA)

N80-33816# Atmospheric Environment Service, Ottawa (Ontario). Boundary Layer Research Div.

MODIFICATION OF THE BOUNDARY LAYER BY OROGRAPHY c44

P. A. Taylor and P. R. Gent (National Center for Atmospheric Research, Boulder, Colo.) *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 143-165 In FRENCH (For primary document see N80-33811 24-42)

Avail: NTIS HC A12/MF A01

Velocity shears and turbulent heat and momentum transfers within the boundary layer strongly influence the interactions between orography or topography and atmospheric flow. Pressure or form drag on hills can arise in neutrally stratified flow with velocity shear as well as in stably stratified situations while heating or cooling on sloping surfaces may produce strong local wind effects. These processes are discussed primarily in the context of models of flow over hills of length scale 10 km or less when boundary layer influence will be most pronounced, however, some larger scale features are included. Among the primary reasons for studying these flows are predictions of 'speed up', separation, and drag.

Author (ESA)

N80-33817# Woods Hole Oceanographic Institution, Mass.

EFFECTS OF BOTTOM TOPOGRAPHY ON OCEAN CURRENTS c48

Nelson G. Hogg *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 167-206 refs (For primary document see N80-33811 24-42)

(Contract N00014-76-C-0197; Grant NSF OCE-78-25405; NR Proj. 083-400)

Avail: NTIS HC A12/MF A01

The theoretical literature concerning steady flow of a rotating fluid past obstacles is reviewed with emphasis on effects of stratification. Obstacles are classified as seamounts, islands and ridges and within the last group channel flow is also considered. Small amplitude topography can produce O(1) relative vorticity - the key parameter being the ratio of the fractional

change in water depth to the Rossby number. If this parameter is greater than some number of O(1) enough relative vorticity can be produced to cause closed streamlines over the obstacle, at least in problems where cross stream variations are allowed. This closed streamline pattern decays with height at a rate which depends on the stratification and can be considered a generalized Taylor column. Inclusion of the latitudinal variation of the vertical component of the Earth's rotation (beta effect), upstream shear, a bottom slope or channel walls permits stationary, lee-wave production. Author (ESA)

N80-33818# European Centre for Medium-Range Weather Forecasts, Reading (England).
CYCLOGENESIS IN THE LEE OF OROGRAPHY AND ITS NUMERICAL MODELING WITH SPECIAL REFERENCE TO THE ALPS **c47**
S. Tibaldi *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 207-232 refs Presented at the GFD Symp.of the 5th EGS Meeting, Strasbourg, France, 29 Aug. - 1 Sep. 1978 Revised (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

The phenomenology of cyclogenesis in the lee of mountain ranges is reviewed and a possible mechanism is discussed which consists of a secondary baroclinic instability triggered on a large-scale wave by the interaction between the low-level flow and the mountain. This will occur only when the perturbation caused by the presence of the obstacle is be sufficiently intense and will act on a basic state (the large-scale wave) where enough available potential energy can be converted into kinetic energy of the eddy. Idealized numerical experiments are reviewed, and it is shown that the phenomenological explanations for cyclogenesis in the literature are consistent with the results from numerical modeling. Comparisons of two real data simulations show that both failed to describe correctly the upper tropospheric development. The experiments seem to confirm the existence of a trigger phase and a baroclinic phase in cyclogenesis, and a separation of the phenomena into two distinct lower tropospheric and upper troposoheric developments. Author (ESA)

N80-33819# Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
LABORATORY STUDIES OF TOPOGRAPHIC EFFECTS IN ROTATING AND/OR STRATIFIED FLUIDS **c46**
P. G. Baines and P. A. Davies (Newcastle-upon-Tyne Univ., England) *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 233-299 refs (For primary document see N80-33811 24-42)
(Grant NSF OCE-78-19833)
Avail: NTIS HC A12/MF A01

All significant laboratory experiments were reviewed which deal with flow past obstacles of various shapes, where these experiments are relevant to motions in the atmosphere and ocean. Only steady or nearly steady flows were considered. Theoretical studies are described where a direct comparison with experimental results is possible. The subject divides into three sections: stratified flows without rotation, rotating homogeneous flows, and rotating stratified flows. Stratified flow experiments include single and multilayer flow, and continuously stratified flow over two and three dimensional barriers. Rotating homogeneous flow experiments dealing with the interior region of the flow include steady uniform and nonuniform flow, flow over isolated obstacles, dimensional obstacles, time dependent flows; and the beta effect. Downstream effects, and experiments with spherical geometry are also considered. Rotating stratified flow experiments with steady uniform flows, flow structure, drag measurements, and nonuniform flows are described. Author (ESA)

N80-33820# Oslo Univ. (Norway). Inst. of Mathematics.
OROGRAPHIC EFFECTS REVEALED BY SATELLITE PICTURES: MESOSCALE FLOW PHENOMENA **c46**
B. Gjevik *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 301-316 refs (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

Satellite observations of mesoscale flow phenomena are reviewed and analyzed, in particular: vortex trails and vortex shedding in the lee of islands, lee-waves due to isolated mountain peaks and complex topographic formations. Atmospheric data obtained by other sounding techniques are included in the analysis. Some theoretical and laboratory studies relevant for the interpretation of the data are reviewed and some unresolved problems are identified. Satellite pictures are presented in order to illustrate special orographic effects. Author (ESA)

N80-33821# Australian Numerical Meteorology Research Center, Melbourne.
OROGRAPHICALLY CONTROLLED CROSS-EQUATORIAL FLOW **c46**
David L. T. Anderson *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 317-355 refs (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

Synoptic analyses, results from models, and theoretical studies of the low level jet stream of the Indian Ocean are presented. In both winter and summer, the strongest cross-equatorial flow is in the west at about 40 deg E regardless of the direction of the flow, probably because of the barrier of the mountains of East Africa. Transient features, diurnal variations, and individual jet streams are associated with the flow. It appears that the flow is driven by the Mascarene high monsoon trough system. It is shown that a divergence, simulates many of the characteristics of the low level jet. Author (ESA)

N80-33822# Washington Univ., Seattle. Dept. of Atmospheric Sciences and Geophysics Group.
OROGRAPHIC EFFECTS IN THE ATMOSPHERES OF OTHER PLANETS **c91**
Conway B. Leovy *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 357-370 refs (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

The effects of Martian topography are considered. Smoothed to a resolution of 500 km surface features show a total variation more than a scale height. Parameters relevant to topographically forced waves are compared for Earth and Mars. Low frequency, planetary scale Martian orographic disturbances are discussed with reference to atmospheric models, only one of which includes the effects of suspended dust. The evidence for topographically forced internal gravity waves is examined along with evidence for thermally driven diurnal and semidiurnal atmospheric tides. Indications of gravity waves on Venus are mentioned. Meteorological data from the Viking lander are presented which show evidence for the occurence of wind oscillations driven by diurnally varying horizontal temperkature gradients over the slope, and wind oscillations driven by diurnally varying coupling between low level winds and winds aloft due to diurnally varying static stability. Author (ESA)

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N80-33823 Louisiana State Univ. and A&M Coll., Baton Rouge.
A QUANTITATIVE EVALUATION OF LANDSAT FOR MONITORING SUSPENDED SEDIMENTS IN A FLUVIAL CHANNEL Ph.D. Thesis
Soon Tae Kim 1980 142 p
Avail: Univ. Microfilms Order No. 8021752

The utility of LANDSAT Multispectral Scanner (MSS) digital data for monitoring suspended sediment concentrations in a natural river channel was determined. Specific purposes of the study were: to investigate vertical distribution of suspended sediment concentrations at the cross section of the river channel; to develop a method of eliminating environmental effects from the MSS digital data obtained during successive LANDSAT overpasses; to evaluate the statistical properties of MSS digital data as related to suspended sediment concentrations in the surface layers of a natural river, and to evaluate the feasibility of estimating suspended sediment concentrations in entire depth

of the river channel via LANDSAT MSS digital data.
Dissert. Abstr.

N80-33824 Colorado Univ. at Boulder.
A MULTI-STEP METHOD FOR AVALANCHE ZONE RECOGNITION AND ANALYSIS Ph.D. Thesis
Thomas Patrick Huber 1980 183 p
Avail: Univ. Microfilms Order No. 8021587

Analytical tools were used to determine avalanche areas and runout zone limits in the Silverton Quadrangle, Colorado, which is located in the central San Juan Mountain Range. Vegetation and geomorphic features were analyzed by the use of natural color and color infrared aerial imagery to produce map. The geomorphology of avalanche runout zones was used to verify and rectify the preceeding mapped areas. The more distinctive features of this morphology included the concave longitudinal profile of the slope, the impact evidence across valleys, and the prominent convex transverse profile. This latter feature is primarily due to the deposition of impounded detritus by the snow avalanche. Finally the changes in soil development brought about by renewed deposition of this detritus were analyzed. It was shown that soil profile differences can be used to delimit the zone of avalanche modification and, therefore, the zone of greatest hazard. Dissert. Abstr.

N80-33825 Johns Hopkins Univ., Baltimore, Md.
A WATERSHED INFORMATION SYSTEM Ph.D. Thesis
Anton Gaarde Thomsen 1980 167 p
Avail: Univ. Microfilms Order No. 8022427

A watershed information system for the analysis and simulation of mountain watersheds is described. Watershed information on topography, vegetation, and soils in digital terrain models (overlays) serve as the data base for watershed analysis, classification of snow in LANDSAT imagery, and automatic generation of parameter decks for operating distributed simulation models of snow cover dynamics and streamflow generation. The computer programs that generate the parameter decks have built-in calibration options for all major processes, that permit fast model calibration from an interactive computer terminal, on watersheds with varying characteristics. Snow processes are simulated within square (5.76 ha) grid-cell elements. The hydrograph resulting from spring snowmelt is simulated by a lateral flow model of streamflow generation driven by the simulated spatially distributed input (snowmelt and rain). Options are available for simulating the effects of forest management alternatives (thinning, clearcutting) on selected forest stands.
Dissert. Abstr.

N80-33826 Colorado State Univ., Fort Collins.
GROUND WATER MONITORING STRATEGIES TO SUPPORT COMMUNITY MANAGEMENT OF ON-SITE HOME SEWAGE DISPOSAL SYSTEMS Ph.D. Thesis
James Douglas Nelson 1980 143 p
Avail: Univ. Microfilms Order No. 8022416

Ground water monitoring strategies were developed by combining deterministic and probabilistic approaches. The variables which need to be considered in such a monitoring program are discussed. Two types of monitoring are defined which need to be incorporated into an overall management plan. Inspection monitoring refers to the monitoring of individual systems to determine if they are exceeding their design discharge of pollutants to the ground water. Trend monitoring is defined as the monitoring which detects over time and space the cumulative effect of a management agencies pollution control efforts. Inspection monitoring strategies are developed in terms of the sampling frequencies necessary to obtain a specific probability of detecting system failure. A mathematical model describing the flow of pollutants through the leach field is developed for the purpose of evaluating sampling plans and a sensitivity analysis is performed to determine the effect of varying the parameters of the system and the input to the leach field.
Dissert. Abstr.

N80-33827 University of Southern California, Los Angeles.
RELATIVISTIC ELECTRON PRECIPITATION: AN OBSERVATIONAL STUDY Ph.D. Thesis
Leopold Joseph Andreoli 1980 320 p
Avail: Univ. Microfilms Order No. 8023268

The morphology of strong diffusion relativistic electron precipitation mechanism and determining atmospheric consequences, were investigated. Analysis of 14 months of magnetic electron spectrometer and proton telescope data from the Air Force S3-3 satellite from July 1976 to September 1977 is presented. Analysis techniques and data catalogues are presented in detail. Three distinct classes of REP's were discovered: precipitation in large range of energies below 1 MeV for electrons with concurrent proton precipitation; electron and proton precipitation occuring only at energies above 1 MeV; and electrons precipitated only at energies below a few hundred KeV.
Dissert. Abstr.

N80-33828 Texas A&M Univ., College Station.
DEVELOPMENT OF A SOIL MOISTURE MODEL FOR USE WITH PASSIVE MICROWAVE REMOTE SENSORS Ph.D. Thesis
Walter Charles Bausch 1980 185 p
Avail: Univ. Microfilms Order No. 8023014

Soil moisture profiles were simulated for a hypothetical loamlike soil with a water and heat balance model. Expected X-band and L-band radiometer response to these conditions were simulated by a radiative transfer model. From these simulations, a model was developed to estimate soil water content in two layers of a 1.5 m soil profile. This model was tested with measurements of soil water content and soil temperature collected during the four seasons of the year in a sandy loam soil contained in an array of lysimeters. X-band and L-band emissivities required in the predictor equations were calculated by the radiative transfer model from measured soil moisture and soil temperature data. The technique developed from simulated results to classify inverted soil moisture profiles was found to be seasonally dependent. It was also found that the second layer algorithm showed seasonal dependence. Predictions of soil water content in the top 21 cm of the soil profile from L-band emissivity calculated by the radiative transfer model occasionally conformed with measured soil water content. Dissert. Abstr.

N80-33829*# Freiburg Univ. (West Germany). Geographisches Inst.
THE INFLUENCE OF TOPOGRAPHIC STRUCTURES ON NIGHT-TIME SURFACE TEMPERATURES: EVALUATION OF A SATELLITE THERMAL IMAGE OF THE UPPER RHINE PLAIN AND THE SURROUNDING HIGHLANDS
Hermann Gossmann, Principal Investigator Ispra, Italy Joint Research Centre of the European Communities Jun. 1980 63 p refs In GERMAN; ENGLISH summary Sponsored by NASA Original contains imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (code 601), Greenbelt, Md. 20771. Domestic users send orders to 'Attn: National Space Science Data Center'; non-domestic users send orders to 'Attn: World Data Center A for Rockets and Satellites'. HCMM
(EB0-10228; NASA-CR-163543) Avail: NTIS HC A04/MF A01 CSCL 05B

The author has identified the following significant results. Satellite data supplied the same information as aerial IR registrations with corresponding averaging for all studies requiring a survey of the thermal pattern within an area measuring 10 km x 10 km or more, provided that sufficiently precise control points could be established for the purpose of geometric rectification in the surroundings of the area observed. Satellite thermal data are more comprehensive than aircraft data for studies on a regional, rather than a local scale, since airborne images often obscure the basic correlation in thermal patterns because of a variety of irrelevant topographical detail. The satellite data demonstrate the dependence of surface temperature on relief more clearly than comparable airborne imagery.

N80-33830*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
A MULTISPECTRAL DATA SIMULATION TECHNIQUE
Marwan J. Muasher and Philip H. Swain, Principal Investigators Jul. 1980 27 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15466; Proj. AgRISTARS)
(EB0-10311; NASA-CR-163379; SR-PO-00469;

LARS-TR-070980) Avail: NTIS HC A03/MF A01 CSCL 05B
There are no author-identified significant results in this report.

N80-33831*# South Dakota State Univ., Brookings. Remote Sensing Inst.
IMPACT OF CELL SIZE ON INVENTORY AND MAPPING ERRORS IN A CELLULAR GEOGRAPHIC INFORMATION SYSTEM
Michael E. Wehde, Principal Investigator Apr. 1979 96 p refs ERTS
(Grant NGL-42-003-007)
(E80-10315; NASA-CR-163403; SDSU-RSI-79-03) Avail: NTIS HC A05/MF A01 CSCL 08B
The author has identified the following significant results. The effect of grid position was found insignificant for maps but highly significant for isolated mapping units. A modelable relationship between mapping error and cell size was observed for the map segment analyzed. Map data structure was also analyzed with an interboundary distance distribution approach. Map data structure and the impact of cell size on that structure were observed. The existence of a model allowing prediction of mapping error based on map structure was hypothesized and two generations of models were tested under simplifying assumptions.

N80-33832*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
UTILIZATION OF SPECTRAL-SPATIAL INFORMATION IN THE CLASSIFICATION OF IMAGERY DATA
C. B. Chittineni, Principal Investigator Jun. 1980 69 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10321; NASA-CR-160737; SR-LO-00419; LEMSCO-14310; JSC-16335) Avail: NTIS HC A04/MF A01 CSCL 02C
There are no author-identified significant results in this report.

N80-33833*# Miami Univ., Fla. School of Marine and Atmospheric Science.
INVESTIGATIONS OF MEDIUM WAVELENGTH MAGNETIC ANOMALIES IN THE EASTERN PACIFIC USING MAGSAT DATA Interim Report, Jun. - Sep. 1980
Christopher G. A. Harrison, Principal Investigator 30 Sep. 1980 57 p refs Sponsored by NASA ERTS
(E80-10334; NASA-CR-163412) Avail: NTIS HC A04/MF A01 CSCL 08G
The author has identified the following significant results. Three long total magnetic field profiles taken over ocean basins were analyzed. It is found that there is a significant signal in the wavelength range of 1500 to 150 km. This is too short a wavelength to be caused by the core field, which becomes insignificant at about a wavelength of 1500 km; this intermediate wavelength signal is not caused by a typical sea floor spreading process, which should give maximum power in the wavelength region about 50 km. It is shown that the external magnetic field contributes very little to this intermediate wavelength signal. Efforts to explain the cause of this signal have failed.

N80-33834*# Institute for Land and Water Management Research, Wageningen (Netherlands).
DEFINING RELATIONSHIPS BETWEEN SURFACE CHARACTERISTICS AND ACTUAL EVAPORATION RATE
M. Menenti, Principal Investigator Ispra, Italy Joint Research Center of the European Communities May 1980 25 p refs Presented at the 4th Meeting of Working Group 2 of the TELLUS Proj., Monterotondo, Italy, 20-21 Nov. 1979 Sponsored by NASA HCMM
(E80-10335; NASA-CR-163541) Avail: NTIS HC A02/MF A01 CSCL 05B
There are no author-identified significant results in this report.

N80-33835*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
A MODEL OF PLANT CANOPY POLARIZATION RESPONSE
V. C. Vanderbilt, Principal Investigator 1980 11 p refs Presented at the 1980 Machine Process. of Remotely Sensed Data Symp. ERTS
(E80-10336; NASA-CR-163444) Avail: NTIS HC A02/MF A01 CSCL 20F
There are no author-identified significant results in this report.

N80-33836# National Oceanic and Atmospheric Administration, Washington, D. C.
IMPROVED ALGORITHM FOR CALCULATION OF UTM AND GEODETIC COORDINATES
Jeff Dozier Sep. 1980 22 p
(NOAA-S/T-80-281; NOAA-TR-NESS-81) Avail: NTIS HC A02/MF A01
Expression of the equations for a UTM (Gauss-Kruger) projection in terms of Jacobian elliptic functions, rather than their series expansions, allows the projection to be used over wider zones than the standard 6 deg strips, and thus makes it applicable to satellite data from the NOAA A-G series. An efficient iterative solution method for either UTM or geodetic coordinates is developed using a complex arithmetic version of Newton's method. The method can be used for longitudes up to 90 deg from the central meridian. Author

N80-33837# National Physical Research Lab., Pretoria (South Africa). Optical Sciences Division.
BONNE'S PROJECTION OF METEOSAT IMAGES
A. S. VanZyl Oct. 1979 20 p refs
(CSIR-SR-FIS-201; ISBN-0-7988-1656-2) Avail: NTIS HC A02/MF A01
Bonne projection achieves area preservation at the expense of shape in representing the curved surface of a sphere on a flat plane. Equal area map projection subroutines were developed, integrated into the CSIR-VICAR image processing system, and applied to Meteosat images for geometric transformation of specified areas. The subroutines are functionally described and factors detracting from the accuracy of the projection are examined. A.R.H.

N80-33838# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). National Council for Scientific and Technical Research.
DEVELOPMENT OF A TECHNIQUE FOR DETERMINING NATURAL RADIOACTIVITY USING SLOW-SPEED AIRCRAFT AT LOW ALTITUDES [DESENVOLVIMENTO DE UNA TECNICA PARA DETERMINACAO DA RADIOACTIVIDADE NATURAL UTILIZANDO AVIAO COM BAIXA VELOCIDADE E VOANDO A BAIXA ALTITUDE]
Inacio Malmonge Martin, Daniel J. R. Nordemann, Lycia M. Moreira Nordemann, Renato Senador, Silyia Regina Darrigo, and Ngan Andre BuiVan Jul. 1980 16 p refs In PORTUGUESE; ENGLISH summary
(INPE-1831-RPE/195) Avail: NTIS HC A02/MF A01
Methods used to perform aerial surveys of natural radioactivity are described. The apparatus includes two (NaI(Tl) detectors, the electronics, and magnetic tape recorder designed to be used onboard a monomotor aircraft at low altitude and low speed. Preliminary tests of this apparatus were made as payload of a captive balloon with intervals of 20 m up to 140 m of altitude. These measurements provided vertical gradients of the terrestrial and secondary cosmic radiation in the lower atmosphere. Measurements at the ground level and onboard a monomotor aircraft Cessna Skyplane were made in the regions of Morro do Ferro and Nuclebras C-09 plant in Pocos de Caldas. Aerial survey of the ambient gamma radiation was performed for the cities of Currais Novo, Campo Redondo, Santa Cruz, S. B. do Trairi, Cutie, Cel. Eziquiel and Frei Martinho in the States of Rio Grande do Norte and Paraiba/Brazil. J.M.S.

N80-33839# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Dept. of Remote Sensing.
THE USE OF RADIATION TEMPERATURE TO DETECT WATER-STRESS IN SUGARCANE CROP M.S. Thesis [O USO DA TEMPERATURA DE RADIACAO PARA DETECTAR O ESTRESSSE DE AGUADA CULTURA DA CANA-DE-ACUCAR]
Liane Antunes Maciel Lucht Jun. 1980 156 p refs In

PORTUGUESE; ENGLISH summary Revised
(INPE-1767-TDL/028) Avail: NTIS HC A08/MF A01

A 36m by 150m section of a 150m by 150m plot in which sugar cane was planted was irrigated periodically over a 4 month period to maintain optimum water level. Field measurements of radiation temperature, soil moisture, and plant water content taken at different times of the year were used to determine a relationship between the radiation temperature (which can be remotely determined), and the soil water content. A heat transfer model for the plant was used to extrapolate the temperature for the complete range of possible values of soil water potential. From the results obtained it is concluded that, in the case of sugar cane, the differences in temperature due to water stress are not so accentuated as in the case of wheat and cotton. The relationship between plant temperature and soil water content show the existence of four distinct regions. An aerial thermal scanner was used to obtain infrared images of the field plot. The contrast between irrigated and nonirrigated images areas leads to a difference of 1 deg C in temperature, which is in close agreement with predictions. A.R.H.

N80-33840# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Division de Information.

A METHOD FOR EDGE DETECTION IN IMAGES OF NATURAL RESOURCES [PROCESSAMENTO DE IMAGENS DETECCAO DE BORDASSEGMENTACAO DE IMAGENS]

Nelson D. A. Mascarenhas and Luciano V. Dutra Dutra Jun. 1980 20 p refs In PORTUGUESE Presented at 20th Symp. of Appl. Graphics and Interactive Graphic Systems, 20-22 Aug. 1980, Sao Paulo, Brazil Revised
(INPE-1768-RPE/154) Avail: NTIS HC A02/MF A01

Images derived from remote and meteorological sensing present a problem in distinguishing the borders (edges) among regions of differing textures. Where texture is defined as localized density, a two stage algorithm is employed: (1) a binary image is statistically derived; (2) regions of high and low density are reduced to uniformity by topological methods. The LANDSAT images thus processed show improved continuity and compare favorably with the natural borders. Transl. by S.F.

N80-33841# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

THERMAL BALANCE OF SOILS [BALANCO TERMICO DE SOLOS]

L. M. Moreira-Nordemann and L. A. Maciel Lucht Aug. 1980 21 p refs In PORTUGUESE; ENGLISH summary Presented at 32d Ann. Meeting of SBPC Revised
(INPE-1859-RPE/210) Avail: NTIS HC A02/MF A01

Soil temperature is a decisive factor controlling bacterial activity, and the processes of plant development and production. For a specific climate condition, soil temperature is a function of the soil geological nature and humidity. The soil energy balance was studied. Measurements of the soil temperatures were made in the infrared region, using a PRT-5 radiometer. The relation between soil absorption heat and its cooling process was determined from terrestrial radiation emission. Correlations between temperature and the main constituents of the soils were studied by means of photoacustic spectroscopy. Thermal inertia and the ratio of heating and cooling of different soil types were determined and these parameters were related to vegetation coverage. A.R.H.

N80-33842# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

CONTRIBUTIONS OF LANDSAT IMAGERY TO THE GEOLOGICAL MAPPING OF THE RIO DO GRANDE SUL SHIELD [CONTRIBUICAO DAS IMAGENS LANDSAT AO CONHECIMENTO GEOLOGICO DE ESCUDO SUL RIOGRANDENSE]

Tomoyuki Ohara Aug. 1980 11 p refs In PORTUGUESE; ENGLISH summary Presented at 32d Ann. Reunion of the Brazilian Soc. for the Progr. of Sci., Rio de Janeiro, 6-12 Jul. 1980
(INPE-1838-RPE/199) Avail: NTIS HC A02/MF A01

The geological mapping in the central western portion of Rio Grande do Sul Shield was performed by the use of LANDSAT multispectral images at the scale of 1:500,000. The conventional photointerpretation was utilized for the geological investigation. The process of extracting information from LANDSAT imagery was based on the analysis of the various features on the Earth's surface, which reflect in diverse photographic elements such as tonal, drainage, topographic, vegetal and land use patterns, in each spectral band. A general geological view was given in the attached stratigraphic column. Interpretation of LANDSAT imagery also shows that (1) the distribution of Santa Barbara Formation is wider than that shown on the existing geological maps; (2) the subdivision of the Guaritas Formation into Varzinha and Guarda Velha Layers is possible; and (3) the granitic bodies and heterogeneous migmatites of the southeastern portion of the study area are considerably different from the existing geological maps. A.R.H.

N80-33843# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

DIGITAL FILTERING OF LANDSAT IMAGES AS A VISUAL AID TECHNIQUE IN GEOLOGICAL PHOTOINTERPRETATION [FILTRAGENS DIGITAIS DE IMAGENS LANDSAT COMO TECNICA DE AUXILIO VISUAL NA FOTOINTERPRETACAO GEOLOGICA]

Waldir Renato Paradella Jul. 1980 14 p refs In PORTUGUESE; ENGLISH summary Presented at 31st Congr. of the Brazilian Geol. Soc., San Catarina, Brazil, 19-25 Oct. 1980 Submitted for publication
(INPE-1823-RPE/189) Avail: NTIS HC A02/MF A01

Digital filtering techniques of LANDSAT imagery were developed as an aid to geologic photointerpretation. Concepts and general procedures are provided for the utilization of these automatic enhancement techniques. S.F.

N80-33844# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

COASTAL CURRENTS: STUDY OF A MODEL APPLIED TO THE COAST OF RIO GRANDE DO SUL LATITUDE 29 DEG SOUTH TO 35 DEG SOUTH [CORRENTES COSTEIRAS: ESTUDO DE UM MODELO APLICADO AO LITORAL DO RIO GRANDE DO SUL LATITUDE 29 DEG SUL 35 DEG SUL]

Claudio Solano Pereira and Luiz Bruner deMiranda Aug. 1980 7 p refs In PORTUGUESE; ENGLISH summary Presented at 32d Ann. Reunion of Brazilian Soc. for the Progr. of Sci., Rio de Janeiro, 6-12 Jul. 1980
(INPE-1841-RPE/201) Avail: NTIS HC A02/MF A01

An analytical model developed to determine coastal currents was applied to the coast of Rio Grande do Sul (lat. 29 deg S to lat. 35 deg. S). The model describes the stationary state nontidal coastal currents. The momentum balance considered is stationary, nonaccelerated, and hydrostatic. Longshore pressure gradients are neglected, while the Coriolis parameter and the vertical momentum exchange coefficient are assumed constant. The water mean density is taken constant in a vertical column but it is allowed to change at a constant rate in the cross shelf direction. With appropriate boundary conditions, a single relationship is obtained between the wind stress, the cross shelf mean density gradient and the fluid velocity. A.R.H.

N80-33845*# National Aeronautics and Space Administration, Washington, D. C.

PRIVATE SECTOR INVOLVEMENT IN CIVIL SPACE REMOTE SENSING. VOLUME 1: REPORT

15 Jun. 1979 37 p Sponsored in part by NOAA, Dept. of the Interior, Dept. of Agriculture, DOD, EPA, Army Corps of Engineers and Dept. of State
(NASA-TM-82206) Avail: NTIS HC A03/MF A01 CSCL 05B

A survey of private sector developers, users, and interpreters of Earth resources data was conducted in an effort to encourage private investment and participation in remote sensing systems. Results indicate positive interest in participation beyond the current hardware contracting level, however, there is a substantial gap between current market levels and system costs. Issues identified include the selection process for an operating entity, the public/private interface, data collection and access policies, price and profit regulation in a subsidized system, international participation, and the responsibility for research and development. It was agreed that the cost, complexity, and security implications

of integrated systems need not be an absolute bar to their private operation. J.M.S.

N80-33846*# National Aeronautics and Space Administration, Washington, D. C.
PRIVATE SECTOR INVOLVEMENT IN CIVIL SPACE REMOTE SENSING. VOLUME 2: APPENDICES
15 Jun. 1980 123 p Sponsored in part by NOAA, Dept. of the Interior, Dept. of Agriculture, DOD, EPA, Army Corps of Engineers and Dept. of State
(NASA-TM-82207) Avail: NTIS HC A06/MF A01 CSCL 05B

The U.S. Space Policy concerning the investment and direct participation in the establishment and operations of remote sensing systems is addressed. Private sector views and state and local government views are presented. Results of a market analysis are pregiven and the economic feasibility of such a program is considered. J.M.S.

N80-33847# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
APPLICATION OF THEMATIC MAPPING TECHNIQUES IN TERRAIN ANALYSIS
Theodore W. Howard Jan. 1980 9 p refs Presented at the ACSM/ASP Conf.
(AD-A089061) Avail: NTIS HC A02/MF A01 CSCL 08/2

The mission to support the Department of Defense (DoD) with terrain information has recently become the responsibility of the Defense Mapping Agency (DMA). The techniques employed to produce data bases of terrain conditions and the synthesizing of this data base information into terrain analysis products are critical in supporting mission requirements. Thematic mapping procedures provide the mechanism by which remote sensors, interpretation techniques, thematic subjects, data analysis techniques, and products can be examined in terms of production feasibility and capabilities. GRA

N80-33848# IBM Federal Systems Center, Gaithersburg, Md.
INTERACTIVE DIGITAL IMAGE PROCESSING INVESTIGATION, PHASE 2
W. C. Rice and J. S. Shipman Apr. 1980 194 p
(Contract DAAK70-77-C-0166)
(AD-A087518; ETL-0221) Avail: NTIS HC A09/MF A01 CSCL 20/6

The development of the interactive multi-channel image classification capabilities of the DIAL system is addressed. Additional DIAL algorithms to support classification were developed, coded, and tested. These included a program module (PM) to apply the Karhunen-Loeve transformation to a multi-channel image, which has the effect of reducing the dimensionality of an image without significantly descreasing its information content. In addition two algorithms in refining class assignment by relaxation methods were developed. One was selected, then coded on DIAL and was applied to a classification of a site, where it removed speckle, sharpened field boundaries, and increased the overall classification accuracy. The programming of the computationally intensive part of the maximum likelihood method on the STRAN computer is described. Finally an experiment in the maximum likelihood classification of a LANDSAT scene using the DIAL PMs was performed. This experiment demonstrated the the utility of the interactive classification algorithms in the study of the relationship between flora and geological structures. M.G.

N80-33849# Lockheed Electronics Co., Inc., Las Vegas, Nev. Remote Sensing Lab.
MULTISPECTRAL TECHNIQUES FOR REMOTE MONITORING OF SEDIMENT IN WATER: A FEASIBILITY INVESTIGATION
Ronald J. Holyer Mar. 1980 173 p refs
(Contract EPA-68-03-2153)
(PB80-198500; EPA-600/4-80-019) Avail: NTIS HC A08/MF A01 CSCL 13B

A data acquisition and analysis program was undertaken to demonstrate the feasibility of remote multispectral techniques for monitoring suspended sediment concentrations in natural water bodies. Two hundred surface albedo measurements (400 to 1,000 nanometers) were made at Lake Mead with coincident water sampling for laboratory analysis. Water volume spectral reflectance was calculated from the recorded surface albedo, and volume reflectance-suspended sediment relationships were investigated. Statistical analysis has shown that quantitative estimates of nonfilterable residue (105 C) and nephelometric turbidity can be made from volume spectral reflectance data with sufficient accuracy to make the multispectral technique feasible for sediment monitoring. GRA

N80-33850# National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Experimental Research Lab.
SPECTRAL GROWTH AND NONLINEAR CHARACTERISTICS OF WIND WAVES IN LAKE ONTARIO Ph.D. Thesis - Michigan Univ., 1977
Paul Chi Liu Nov. 1979 63 p refs
(PB80-193261; NOAA-80050701; NOAA-TR-ERL-408-GLERL-14) Avail: NTIS HC A04/MF A01 CSCL 08H

Using continuous wave data, the temporal characteristics of linear and nonlinear interactions during wave growth are examined. Unispectra, bispectra, and trispectra of continuously recorded wave data during three episodes of growing waves are used. While the unispectrum provides information on the energy content of the frequency components, the bispectrum and trispectrum generally provide information on the interactive relations between two and three frequency components respectively. These higher order interactive relations can be considered characterization of nonlinear interactions. The results indicate that the peak energy frequency transfers more energy to the lower frequency components than to the higher ones, which is confirmation that unispectral peaks shift progressively toward lower frequencies during wave growth. GRA

N80-33851# Missouri Univ., Columbia. Dept. of Geology.
GRAVITY GEOPHYSICAL DELINEATION OF BURIED CHANNEL AQUIFERS IN THE DISSECTED TILL PLAINS OF NORTHERN MISSOURI M.S. Thesis
Morris David Hall Dec. 1979 105 p refs
(Contract DI-14-34-0001-9027)
(PB80-194343; W80-05463; OWRT-A-112-MO(2)) Avail: NTIS HC A06/MF A01 CSCL 08H

Several methods of gravity geophysics, in conjunction with drift thickness and bedrock topography maps, were used to map the location of buried river valleys in northwestern Missouri. Drift thickness varies from zero to over 100 meters within the selected study area. The bured valleys are often filled with thick sequences of glaxial fluvial deposits which can serve as important aquifers. Over 900 gravimeter readings established a grid network over the study area. Two methods were used to calculate the regional Bouguer free air anomaly. Gravity profiles were run normal to several suspected buried valleys. The gravity residual profiles showed a strong correlation to bedrock topography, where known, and to several theoretical models. GRA

N80-33852# Northeastern Forest Experiment Station, Broomall, Pa.
SITE INDEX PREDICTION TABLES FOR OAK IN NORTHWESTERN WEST VIRGINIA Final Report
Neil Lamson 1980 9 p refs
(PB80-189830; NEFES-80-73; FSRP-NE-462) Avail: NTIS HC A02/MF A01 CSCL 02F

Prediction tables for even-aged stands of white, chestnut, northern red, scarlet, and black oaks were used to estimate the site index of forest land in 13 countries of northwestern West Virginia. The half width of the 95 percent confidence interval of the predicted site index was included; it was used to determine the number of sample trees necessary to attain given levels of precision, or to determine the precision of a site index prediction for a known number of sample trees. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N80-33853 California Univ., Los Angeles.
ELECTROCHEMICALLY DEPOSITED CADMIUM TELLURIDE FILMS AND THEIR APPLICATION TO SOLAR CELLS Ph.D. Thesis
Bulent Mehmet Basol 1980 128 p
Avail: Univ. Microfilms Order No. 8023271

The electronic and optical properties of electrochemically deposited CdTe films were investigated. Schottky barrier solar cells produced using this material are also characterized. The material was evaluated using various techniques such as current vs. voltage measurements, capacitance measurements as a function of frequency and temperature, photoconductivity, transmission, reflection and other measurements. The optical bandgap and optical absorption coefficients were determined. Deep trapping levels were observed and evaluated by various techniques and were attributed to the native defects of the material. The important electrical and structural properties of the material were correlated with the different parameters involved in the electrochemical process such as the rest potential, temperature and tellurium concentration. Solar cells with 4 percent internal efficiencies were prepared using gold Schottky barrier devices on n-type electrodeposited CdTe films.
Dissert. Abstr.

N80-33854 Polytechnic Inst. of New York.
OPTIMUM SYSTEMS DESIGN WITH RANDOM INPUT AND OUTPUT APPLIED TO SOLAR WATER HEATING Ph.D. Thesis
Layek Lamel Abdel-Malek 1980 157 p
Avail: Univ. Microfilms Order No. 8019381

Solar water heating systems are evaluated. Models were developed to estimate the percentage of energy supplied from the Sun to a household. Since solar water heating systems have random input and output queueing theory, birth and death processes were the major tools in developing the models of evaluation. Microeconomics methods help in determining the optimum size of the solar water heating system design parameters, i.e., the water tank volume and the collector area.Dissert. Abstr.

N80-33855 Colorado State Univ., Fort Collins.
LOCAL RESPONSE OF ITO/POLYSILICON SOLAR CELLS Ph.D. Thesis
Narumi Inoue 1980 135 p
Avail: Univ. Microfilms Order No. 8022405

Scanning light spot (SLS) and electron beam induced current (EBIC) techniques were used to study the local response of ITO/polysilicon solar cells. The micrographs obtained by these techniques were interpreted from the viewpoint of constrast mechanism, resolution and specimen properties. The SLS and EBIC techniques were applied to polycrystalline causes of the local variation in cell response. The minority carrier duffusion length does not significantly effect the response around dislocations and grain boundaries. The intragrain defects reduce the cell current response as well as grain boundaries and sometimes reduce the output more than grain boundaries. This was proved by the measurement of the local diffusion length and the correlation with the active defect density and cell response.
Dissert. Abstr.

N80-33856 Texas Univ. at Austin.
EVALUATION OF HYDROPOWER POTENTIAL IN A RIVER BASIN Ph.D. Thesis
Hettigamage Cyril Kariyawasam 1980 152 p
Avail: Univ. Microfilms Order No. 8021455

A methodology to evaluate the available hydropower potential in a river basin is described. The model was used to evaluate available hydropower potential in five different levels of gross and net potentials: gross precipitation potential, gross surface runoff potential, gross river potential, net potential with reservoirs meeting individual power demands, and net potential with reservoirs operating as a single system. This model requires only minimum data, available with most of the river basins of the world. The model was demonstrated by application to the San Antonio river basin in Texas. Relationships between different levels of gross and net potential are analyzed. Additional applications of this method of analysis to other natural energy sources are suggested. Modifications and improvements to the model are proposed.
Dissert. Abstr.

N80-33857*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TOROIDAL CELL AND BATTERY Patent Application
William J. Nagle, inventor (to NASA) Filed 28 Mar. 1980 13 p
(NASA-Case-LEW-12918-1; US-Patent-Appl-SN-134855) Avail: NTIS HC A02/MF A01 CSCL 10C

A toroidal cell is disclosed which includes a wound core disposed within a pair of toroidal channel shaped electrodes separated by nylon insulator. The shape of the case electrodes of this cell allows one doughnut shaped surface and the inner cylindrical case wall to be used as an electrode and a second planar doughnut shaped surface and the outer cylindrical case wall to be used as another electrode. Connectors may be used to stack two or more toroidal cells together by connecting the entire surface area of the electrode of one cell to the entire surface area of the electrode of a second cell. The central cavity of each toroidal cell may be used as a conduit for pumping a fluid through the toroidal cell to thereby cool the cell.
NASA

N80-33858*# First National Bank of Clarksdale, Miss.
SOLAR HEATING SYSTEM AT QUITMAN COUNTY BANK, MARKS, MISSISSIPPI Final Report
Jun. 1980 119 p Sponsored by NASA
(Contract EM-78-F-01-5199)
(NASA-CR-161549) Avail: NTIS HC A06/MF A01 CSCL 10B

Information on the Solar Energy Heating System installed in a single story wood frame, cedar exterior, sloped roof building is presented. The system has on-site temperature and power measurements readouts. The 468 square feet of Solaron air flat plate collectors provide for 2,000 square feet of space heating, an estimated 60 percent of the heating load. Solar heated air is distributed to the 235 cubic foot rock storage box or to the load (space heating) by a 960 cubic feet per minute air handler unit. A 7.5 ton Carrier air-to-air heat pump with 15 kilowatts of electric booster strips serve as a back-up (auxiliary) to the solar system. Motorized dampers control the direction of airflow and back draft dampers prevent thermal siphoning of conditioned air.
T.M.

N80-33859*# General Electric Co., Schenectady, N. Y.
COGENERATION TECHNOLOGY ALTERNATIVES STUDY (CTAS). VOLUME 4: ENERGY CONVERSION SYSTEMS
D. H. Brown, H. E. Gerlaugh, and R. R. Priestley Apr. 1980 178 p refs
(Contract DEN3-31)
(NASA-CR-159768; GE80ET0103-Vol-4; DOE/NASA/0031-80/4-Vol-4) Avail: NTIS HC A09/MF A01 CSCL 10B

Industrial processes from the largest energy consuming sectors were used as a basis for matching a similar number of energy conversion systems that are considered as candidate which can be made available by the 1985 to 2000 time period. The sectors considered included food, textiles, lumber, paper, chemicals, petroleum, glass, and primary metals. The energy conversion systems included steam and gas turbines, diesels, thermionics, stirling, closed-cycle and steam injected gas turbines, and fuel cells. Fuels considered were coal, both coal and petroleum-based residual and distillate liquid fuels, and low Btu gas obtained through the on-site gasification of coal. An attempt was made to use consistent assumptions and a consistent set of ground rules specified by NASA for determining performance and cost. The advanced and commercially available cogeneration energy

conversion systems studied in CTAS are fined together with their performance, capital costs, and the research and developments required to bring them to this level of performance.
Author

N80-33860*# General Electric Co., Schenectady, N. Y. Energy Technology Operation.
COGENERATION TECHNOLOGY ALTERNATIVES STUDY (CTAS). VOLUME 6: COMPUTER DATA. PART 1: COAL-FIRED NOCOGENERATION PROCESS BOILER, SECTION A Final Report
W. F. Knightly May 1980 481 p refs Prepared for DOE
6 Vol.
(Contract DEN3-31)
(NASA-CR-159770-Pt-1; GE80ET0105-Vol-6-Pt-1; DOE/NASA/0031-80/6) Avail: NTIS HC A21/MF A01 CSCL 10B

Various advanced energy conversion systems (ECS) are compared with each other and with current technology systems for their savings in fuel energy, costs, and emissions in individual plants and on a national level. About fifty industrial processes from the largest energy consuming sectors were used as a basis for matching a similar number of energy conversion systems that are considered as candidates which can be made available by the 1985 to 2000 time period. The sectors considered included food, textiles, lumber, paper, chemicals, petroleum, glass, and primary metals. The energy conversion systems included steam and gas turbines, diesels, thermionics, stirling, closed cycle and steam injected gas turbines, and fuel cells. Fuels considered were coal, both coal and petroleum based residual and distillate liquid fuels, and low Btu gas obtained through the on-site gasification of coal. Computer generated reports of the fuel consumption and savings, capital costs, economics and emissions of the cogeneration energy conversion systems (ECS's) heat and power matched to the individual industrial processes are presented for coal fired process boilers. National fuel and emissions savings are also reported for each ECS assuming it alone is implemented.
Author

N80-33861*# General Electric Co., Schenectady, N. Y.
COGENERATION TECHNOLOGY ALTERNATIVES STUDY (CTAS). VOLUME 6: COMPUTER DATA. PART 2: RESIDUAL-FIRED NOCOGENERATION PROCESS BOILER Final Report
W. F. Knightly May 1980 287 p
(Contract DEN3-31)
(NASA-CR-159770-Pt-2; GE80ET0105-Vol-6-Pt-2; DOE/NASA/0031-80/6-Vol-6-Pt-2) Avail: NTIS HC A13/MF A01 CSCL 10B

Computer generated data on the performance of the cogeneration energy conversion system are presented. Performance parameters included fuel consumption and savings, capital costs, economics, and emissions of residual fired process boilers.
T.M.

N80-33862*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MOD-2 WIND TURBINE FARM STABILITY STUDY Final Report
E. N. Hinrichsen Jun. 1980 170 p refs
(Contracts DEN3-134; DE-AI01-79ET-20305)
(NASA-CR-165156; R35-40; DOE/NASA/0134-1) Avail: NTIS HC A08/MF A01 CSCL 10A

The dynamics of single and multiple 2.5 ME, Boeing MOD-2 wind turbine generators (WTGs) connected to utility power systems were investigated. The analysis was based on digital simulation. Both time response and frequency response methods were used. The dynamics of this type of WTG are characterized by two torsional modes, a low frequency 'shaft' mode below 1 Hz and an 'electrical' mode at 3-5 Hz. High turbine inertia and low torsional stiffness between turbine and generator are inherent features. Turbine control is based on electrical power, not turbine speed as in conventional utility turbine generators. Multi-machine dynamics differ very little from single machine dynamics.
T.M.

N80-33863*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CHARACTERIZATION OF THREE TYPES OF SILICON SOLAR CELLS FOR SEPS DEEP SPACE MISSION. VOLUME 3: CURRENT-VOLTAGE CHARACTERISTICS OF SPECTRO-LAB SCULPTURED BSR/P+(K7), BSR/P+(K6.5) AND BSR (K4.5) CELLS AS A FUNCTION OF TEMPERATURE AND INTENSITY
A. F. Whitaker, S. A. Little, V. A. Wooden, D. E. Carter, B. E. Cothren, and C. A. Torstenson Aug. 1980 91 p refs
(NASA-TM-78305) Avail: NTIS HC A05/MF A01 CSCL 10A

Three types of high performance silicon solar cells, sculptured BSR/P+(K7), BSR/P+(K6.5) and BSR(K4.5) manufactured by Spectrolab were evaluated for their low temperature and low intensity performance. Sixteen cells of each type were subjected to 11 temperatures and 9 intensities. The sculptured BSR/P+(K7) cells provided the greatest maximum power output both at 1 AU and at LTLI conditions. The average efficiencies of this cell were 14.4 percent at 1 SC/+25 deg C and 18.5 percent at 0.086 SC/-100 deg C.
T.M.

N80-33864*# Wormser Scientific Corp., Stamford, Conn.
INSTALLATION, OPERATION, AND MAINTENANCE FOR THE PYRAMIDAL OPTICS SOLAR SYSTEM INSTALLED AT YACHT COVER, COLUMBIA, SOUTH CAROLINA
Sep. 1980 105 p Sponsored in part by DOE
(Contract NAS8-32250)
(NASA-CR-161203) Avail: NTIS HC A06/MF A01 CSCL 10A

Information concerning the installation, operation, and maintenance of the pyramidal Solar System for space heating and domestic hot water is presented. Principles of operation, sequence of installation, and procedures for the operation and maintenance of each subsystem making up the solar system are presented. Troubleshooting charts and maintenance schedules are presented.
T.M.

N80-33865*# Wormser Scientific Corp., Stamford, Conn.
DESIGN DATA BROCHURE FOR A PYRAMIDAL OPTICAL SOLAR SYSTEM
Sep. 1980 36 p Sponsored in part by DOE
(Contract NAS8-32250)
(NASA-CR-161202) Avail: NTIS HC A03/MF A01 CSCL 10A

A pyramidal optics solar system for solar heating and domestic hot water is described. The system is made up of the collecting, storage, and distribution subsystems. System description, available accessories, installation arrangements, physical data, piping and wiring diagrams, and guide specifications are included.
J.M.S.

N80-33866*# Elcam, Inc., Santa Barbara, Calif.
INSTALLATION PACKAGE FOR A SUNSPOT CASCADE SOLAR WATER HEATING SYSTEM
Sep. 1980 51 p Sponsored in part by DOE
(Contract NAS8-32245)
(NASA-CR-161562) Avail: NTIS HC A04/MF A01 CSCL 10A

Solar water heating systems installed at Tempe, Arizona and San Diego, California are described. The systems consist of the following: collector, collector-tank water loop, solar tank, conventional tank, and controls. General guidelines which may be utilized in development of detailed installation plans and specifications are provided along with instruction on operation, maintenance, and installation of solar hot water systems.
J.M.S.

N80-33867*# Elcam, Inc., Santa Barbara, Calif.
DESIGN PACKAGE FOR SOLAR DOMESTIC HOT WATER SYSTEM
Sep. 1980 149 p refs Sponsored in part by DOE
(Contract NAS8-32245)
(NASA-CR-161558) Avail: NTIS HC A07/MF A01 CSCL 10A

The initial design of a solar domestic hot water system is considered. The system performance specification and detailed design drawings are included. The hot water systems consist of the following subsystems: collector, storage, control, transport, auxiliary energy, and government-furnished site data acquisition. The two systems are installed at Tempe, Arizona, and San Diego, California.
J.M.S.

N80-33868# National Mechanical Engineering Research Inst., Pretoria (South Africa). Aeromechanics Div.
THE AERODYNAMICS OF CONTRA-ROTATING AXIAL FLOW WIND POWER TURBINES
W. J. vanderElst Nov. 1979 28 p refs
(CSIR-ME-1638; ISBN-0-7988-1467-5) Avail: NTIS HC A03/MF A01

The special case of a contra-rotating, axial flow turbine is analyzed and it is shown in what operating regime such wind machines with contra-rotating rotors are superior to the conventional single rotor turbine. Nondimensional parameters suitable for use in designing contra-rotating blades are presented by means of formulae and graphs. Author

N80-33869*# Rockwell International Corp., Downey, Calif. Space Systems Group.
SATELLITE POWER SYSTEMS (SPS) CONCEPT DEFINITION STUDY. VOLUME 2, PART 2: SYSTEM ENGINEERING
G. M. Hanley Sep. 1980 422 p
(Contract NAS8-32475)
(NASA-CR-3319; SSD-79-0010-2-2) Avail: NTIS HC A18/MF A01 CSCL 10A

The latest technical and programmatic developments are considered as well as expansions of the Rockwell SPS cost model covering each phase of the program through the year 2030. Comparative cost/economic analyses cover elements of the satellite, construction system, space transportation vehicles and operations, and the ground receiving station. System plans to define time phased costs and planning requirements that support major milestones through the year 2000. A special analysis is included on natural resources required to build the SPS reference configuration. An appendix contains the SPS Work Breakdown Structure and dictionary along with detail cost data sheet on each system and main element of the program. Over 200 line items address DDT&E, theoretical first unit, investment cost per satellite, and operations charges for replacement capital and normal operations and maintenance costs. A.R.H.

N80-33870# Committee on Interstate and Foreign Commerce (U. S. House).
ENERGY POLICY: SUPPLY AND DEMAND ALTERNATIVES
Washington GPO 1980 97 p refs Hearing before the Subcomm. on Oversight and Invest. of the Comm. on Interstate and Foreign Com., 96th Congr., 1st Sess., 26 Jul. 1979
(GPO-56-541) Avail: Subcommittee on Oversight and Investigations

The international energy crisis and U.S. energy policy are discussed. Factors of supply and demand are evaluated and recommendations made for conserving energy and reducing dependence on foreign oil. Synthetic fuels and the processes of coal gasification and coal liquefaction are evaluated. S.F.

N80-33871# Committee on Interstate and Foreign Commerce (U. S. House).
INCENTIVES FOR ENERGY CONSERVATION
Washington GPO 1980 241 p refs Joint hearing before the Subcomm. on Oversight and Invest. of the Comm. on Interstate and Foreign Com., and the Subcomm. on the City of the Comm. on Banking, Finance and Urban Affairs, 96th Congr., 1st Sess., 26 Oct. 1979
(GPO-55-634) Avail: Subcommittee on Oversight and Investigations

Ways to make homes and workplaces more energy efficient were discussed. Due to rise in the average price of world crude oil, the need for across the board energy savings was stressed. Tax credit for conservation measures and solar installations was considered to favor the affluent and to discriminate against the poor. New York's program to achieve energy conservation was described. Conservation is considered to be a cheaper way of meeting the energy needs than building new generating plants or producing synthetic gas from coal. R.K.G.

N80-33872# Committee on Science and Technology (U. S. House).
OVERSIGHT: WIND ENERGY PROGRAM
Washington GPO 1979 190 p Hearing before the Subcomm. on Energy Develop. and Appl. of the Comm. on Sci. and Technol., 96th Congr., 1st Sess., no. 35, 30 Jul. 1979
(GPO-51-382) Avail: SOD

Testimony is presented on renewable energy sources with emphasis on the wind energy program. Efforts to develop numerous sizes of wind machines to serve various applications and to meet differing market requirements are highlighted. Wind energy is identified as having the highest potential of all the solar electric technologies to contribute sizable amounts of energy by the year 2000. The capability of the wind energy program to realize this potential is discussed. J.M.S.

N80-33873# European Space Agency, Paris (France).
PHOTOVOLTAIC GENERATORS IN SPACE
W. R. Burke, ed. Jun. 1980 266 p refs Presented at 2nd European Symp., Heidelberg, 15-17 Apr. 1980; sponsored by DGLR e.V.
(ESA-SP-147) Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Design and verification of solar blankets, ultrathin cell module technology, solar array diodes, space qualified GaAs solar cells, and cell covers are discussed. Other topics include radiation effects on solar cells, computer aided design techniques applied to solar arrays, tests of cells, arrays, and structures. For individual titles, see N80-33874 through N80-33904.

N80-33874# European Space Technology Center, Noordwijk (Netherlands).
THE SOLAR CELL BLANKET DESIGN FOR SPACE TELESCOPE'S ROLL-OUT SOLAR ARRAY
R. L. Crabb, H. C. Allen (British Aerospace Dynamics Group), and G. Pohl (AEG-Telefunken) *In* ESA Photovoltaic Generators in Space Jun. 1980 p 3-11 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

A general description is given of the 4 kW solar array for the shuttle launched, NASA Space Telescope. The solar blankets which embody shunt diodes for shadow protection are discussed. Thermal cycling test results (about 30,000 cycles) are presented for various components and subassemblies. Solar cell performance characteristics, lifetime power profile, and mass breakdown are given. Author (ESA)

N80-33875# AEG-Telefunken, Wedel (West Germany).
MANUFACTURING OF SPACE TELESCOPE SOLAR ARRAY BLANKETS
Gunter Kuechler *In* ESA Photovoltaic Generators in Space Jun. 1980 p 13-17 (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Fabrication details are listed for the flexible substrate and solar cell array subsections, including the bonding of the cells to the substrate. A vacuum device is used to position each array subsection. Adhesive is applied to the substrate with a screen printing technique. A special jig is described which is used for the interconnection of the solar panel assemblies and buffer assemblies. The jig may be used for replacing single arrays of buffers within a complete blanket. Author (ESA)

N80-33876# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
ULTRATHIN CELL MODULE TECHNOLOGY
Guenther J. LaRoche *In* ESA Photovoltaic Generators in Space Jun. 1980 p 21-27 refs Sponsored in part by International Telecommunications Satellite Organization (Intelsat) (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Fabrication details are given for the use of 50 micron silicon solar cells with thin covers in an ultra light panel (ULP). Welding difficulties are described, which led to the design of an interconnector. Bonding of 50 micron and 100 micron covers was done under vacuum, with weights being necessary for good adhesion. Manufacturing yields are given for each fabrication step for both SOLAREX and OCLI cells. Electrical data are given for cells and modules before and after laydown. A yield of 80% was realized in a batch of 400 cells, which could be improved with better cell flatness and if the rear cell coating extended to the cell edge. Power and power to weight ratios are compared for ULP and conventional cells. Author (ESA)

N80-33877# Optical Coating Lab., Inc., Santa Rosa, Calif.
FROSTED SOLAR CELL COVERS
J. Rancourt, W. T. Beauchamp, G. Silipo, I. Sachs, and G. Contos *In* ESA Photovoltaic Generators in Space Jun. 1980 p 29-34 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

The differences in surface morphology between ground or etched fused silica covers, and the resulting differences in optical properties are reviewed. Hemispherical reflectance is reduced, emittance increased, and less high angle light is scattered. The phenomenology of these properties is discussed. Configurations are mentioned in which the ultraviolet reflecting coating is placed on the outer, etched surface, or in which both sides are frosted. Microsheet was eliminated as a substitute for fused silica, for the acid etching process. Author (ESA)

N80-33878# European Space Technology Center, Noordwijk (Netherlands).
STUDY OF THE INTERNAL MECHANICS OF SPACE PHOTOVOLTAIC GENERATORS
D. Richard *In* ESA Photovoltaic Generators in Space Jun. 1980 p 35-44 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

A comprehensive study of the internal mechanics of solar cell modules was performed. The results are reviewed, including static and fatigue properties of solar array materials, a mathematical model of a cover integrated cell bonded on a structure, and a comparison of the model results with load tests. Optimization of solar arrays is mentioned. Factors affecting the fatigue life of interconnectors are discussed and a mathematical analysis reported. The most important findings state that: the thicker the adhesive layer, the better the design; the smaller the adhesive surface, the better the design; below -120 C the stress levels in the bonded materials are nearly constant; the interconnector fatigue life is not only influenced by the mechanical and the thermal loads but also by the base material history and the operation phases it has to go through; and the adhesives in the wiring are the most critical parts of the wiring. Their dependability can be increased by increasing their thickness. Author (ESA)

N80-33879# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost.
THE ECS SOLAR ARRAY
R. Zwanenburg *In* ESA Photovoltaic Generators in Space Jun. 1980 p 47-54 (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

The electrical and structural design is outlined, and the development and qualification tests described. The interchangeable panels are made of unidirectional carbon fiber plies bonded to an aluminum honeycomb core. Hardware such as hinges, holddown points, release system, and spring driven cable synchronized deployment mechanism is described. The natural frequencies and mass breakdown are given. Vibration test results are presented, as well as results from deployment tests.
Author (ESA)

N80-33880# Societe Nationale Industrielle Aerospatiale, Cannes (France).
SPOT SOLAR ARRAY
Gerard Barkats, Michel Calvy, and Michel Cathala *In* ESA Photovoltaic Generators in Space Jun. 1980 p 55-63 (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

The electrical and structural designs are presented for a double deployment direction flexible fold-out solar array. The required power in orbit is 1 kW at the end of two years. Flexibility for different missions and the constraints of the Ariane shroud are design considerations. A stowage box was designed to accommodate all proposed configurations of array. An air bag system protects the folded blankets. Solar panels are built up of standard subpanels. Arrays up to 11.7 m in span are possible. Mass and power output data are given for various size arrays.
Author (ESA)

N80-33881# British Aerospace Dynamics Group, Bristol (England).
TELESCOPIC MASTS FOR DEPLOYMENT OF FLEXIBLE SOLAR ARRAYS
P. A. Champion *In* ESA Photovoltaic Generators in Space Jun. 1980 p 65-71 (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Detail design features of a nine element 16 m aluminum mast are given. These masts are driven by stored gas and controlled by an escape mechanism. Test results and their correlation with analytical models are reviewed, and a description of an alternative, mechanical drive system under development for future missions requiring retraction capability is given.
Author (ESA)

N80-33882# AEG-Telefunken, Wedel (West Germany). Space and New Technologies Div.
POTENTIAL USE OF TERRESTRIAL PHOTOVOLTAICS FOR FUTURE SPACE SOLAR ARRAYS
H. Bebermeier and J. Rath *In* ESA Photovoltaic Generators in Space Jun. 1980 p 73-77 (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

The status and development goals of terrestrial and space solar cells are compared. Present terrestrial solar array production lines make use of many space qualified technologies and processes and can be utilized, either with terrestrial or with space solar cells, for the manufacture of large area space solar arrays. It is shown that single crystal silicon solar cells can be used at potentially lower cost when a moderate mass increase of the array is acceptable. A space telescope solar array, scaled up to 25 kW would require a 6% increase in blanket size and a 32% mass increase. Author (ESA)

N80-33883# European Space Technology Center, Noordwijk (Netherlands).
DESIGN AND TECHNOLOGY OF SOLAR ARRAYS FOR SHUTTLE LAUNCHED MISSIONS
K. Bogus, M. Cathala (SNIAS, Cannes, France), B. Goergens (AEG-Telefunken, Wedel, West Germany), and J. Kerstens (Royal Netherlands Aircraft Factory Fokker, Schiphol-Oost) *In* ESA Photovoltaic Generators in Space Jun. 1980 p 79-91 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Very large solar arrays in the 15 to 20 kW power range will be needed for enhancing the low Earth orbit (LEO) operational capabilities for missions utilizing the space transportation system (STS) and Spacelab. A conceptual solar array design study was performed in order to identify the resulting solar array technology requirements. Advantages and disadvantages are listed for both nonplanar and rectangular flat array designs, including both structural considerations and blanket design. Thermal aspects of stowage box design are mentioned. The most promising concept is a modular split blanket array with retractable fold out blankets and a collapsible truss mast. Author (ESA)

N80-33884# AEG-Telefunken, Heilbronn (West Germany). Semiconductor Div.
ASPECTS OF LARGE AREA AND THIN SILICON SOLAR CELL TECHNOLOGIES
K.-D. Rasch and K. Roy *In* ESA Photovoltaic Generators in Space Jun. 1980 p 95-99 refs Sponsored by Bundesministerium fuer Forschung und Technologie (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Computer and experimental data are given for thin high efficiency cells utilizing back surface reflector (BSR) and back surface field (BSF) technologies. It is shown that there is no advantage in employing BSF technology for cells thicker than 100 micrometers. The BSR technology is useful for all thicknesses. Cells thinner than 100 micrometers have higher end of life power than thicker ones when BSR and BSF are used. For cells thinner than 100 micrometers, a redesign of cover glasses, interconnectors, and solar panel construction is necessary to profit from cell weight advantages. Author (ESA)

N80-33885# Spectrolab, Inc., Sylmar, Calif.
THIN, HIGH EFFICIENCY SILICON SOLAR CELLS
R. Opjorden, M. Gillanders, and J. Fodor *In* ESA Photovoltaic Generators in Space Jun. 1980 p 101-104 ref (For primary

document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Data are presented for cell processing yields, beginning-of-life electrical outputs, electron, neutron and proton irradiation effects, and thermal alpha measurements. Panel fabrication techniques for thin cells are also discussed. A viable process sequence was established for the cells using high purity, low resistivity, gallium doped float zone silicon as the starting material. They exhibited enhanced radiation hardness and showed stability under proton irradiation, regardless of thickness. Author (ESA)

N80-33886# Hughes Aircraft Co., El Segundo, Calif. Space and Communications Group.
QUALIFICATION TEST RESULTS OF THE PRODUCTION HIGH EFFICIENCY K6-3/4 AND K7 SILICON SOLAR CELLS
Leland J. Goldhammer *In* ESA Photovoltaic Generators in Space Jun. 1980 p 105-115 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

The K6-3/4 and K7 solar cells were fully qualified and characterized for use in a space environment. These solar cells are a 10 Ohm-cm, shallow diffused, N/P solar cell with a back surface field, and an aluminum back surface reflector. The front surface of the K6-3/4 solar cell has a dual layer antireflective coating and the front surface of the cover glass is frosted (etched). The front surface of the K7 solar cell is sculptured (etched) and has a single layer antireflective coating; the front surface of the cover glass is polished. Both solar cell types are solder coated. The tests performed and a description of test conditions are lised. Author (ESA)

N80-33887# AEG-Telefunken, Heilbronn (West Germany). Semiconductor Dw.
DIODES FOR SPACE SOLAR ARRAYS
G. Friedrich, K.-D. Rasch, and K. Roy *In* ESA Photovoltaic Generators in Space Jun. 1980 p 117-120 refs Sponsored by Bundesministerium fuer Forschung und Technologie and ESA (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

A large area semiconductor diode was developed. The advantages of the diode are high thermal radiation, high reflectance and low heat generation. The electrical characteristics of the diode in forward and reverse bias in the temperature range -150 C to + 150 C are given. Transient behavior in a switching application was tested. At 125 C the reverse recovery time is below 1 microsecond. Author (ESA)

N80-33888*# Hughes Research Labs., Malibu, Calif.
DEVELOPMENT OF SPACE-QUALIFIED GaAs SOLAR CELLS
R. C. Knechtli, G. S. Kamath, J. Ewan, and R. Y. Loo *In* ESA Photovoltaic Generators in Space Jun. 1980 p 121-126 refs Sponsored in part by NASA and USAF (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80 CSCL 10A

Cells 2 cm x 2 cm were produced having an efficiency of 16% at 100 C and 12% at 200 C. They were superior to silicon cells under 1 MeV electron bombardment up to fluences in excess of 10 to the 15th power electron per sq cm, and to protons with an energy in excess of 1 MeV. The possibility of producing cells in quantity using a graphite wafer holder is mentioned. Author (ESA)

N80-33889*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RADIATION DAMAGE IN HIGH VOLTAGE SILICON SOLAR CELLS
Irving Weinberg, Henry W. Brandhorst, Clifford K. Swartz, and Victor G. Weizer *In* ESA Photovoltaic Generators in Space Jun. 1980 p 129-134 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80 CSCL 10A

High open circuit voltage cell designs based on 0.1 Ohm cm p-type silicon were irradiated with 1 MeV electrons and their performance determined to fluences as high as 10 to the 15th power per sq cm. Of the three cell designs, radiation induced degradation was greatest in the high low emitter (HLE) cell. The diffused and ion implanted cells degraded approximately equally but less than the HLE cell. Degradation was greatest in an HLE cell exposed to X-rays before electron irradiation. The cell regions controlling both short circuit current and open circuit voltage degradation were defined in all three cell types. An increase in front surface recombination velocity accompanied time dependent degradation of an HLE cell after X-irradiation. It was speculated that this was indirectly due to a decrease in positive charge at the silicon oxide interface. Modifications aimed at reducing radiation induced degradation are proposed for all three cell types. Author (ESA)

N80-33890# AEG-Telefunken, Heilbronn (West Germany).
COMPARISON OF SILICON SOLAR CELL CHARACTERISTICS AT OPERATING TEMPERATURE AFTER ELECTRON IRRADIATION
R. Schilling, K.-D. Rasch, and H. Bebermeier *In* ESA Photovoltaic Generators in Space Jun. 1980 p 135-139 refs Sponsored by Bundesministerium fuer Forschung und Technologie (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

The degradation characteristics during electron irradiation of different solar cell structures were determined. High efficiency cells (HEC), back surface field (BSF), back surface reflector (BSR), nonreflective and back surface field reflector (BSFR) cells were fabricated from a float zone and from a crucible grown boron doped crystal. The solar cell data including the solar absorptance and the temperature dependence of cell parameters were determined after fabrication and after 1 MeV electron irradiation of fluences in the range of 3 x 10 to the 13th power per sq cm to 2 x 10 to the 15th power per sq cm. The difference cell structures can be directly compared at standard test conditions and at operating conditions excluding influences of material variations. The effects of BSR, which controls the operating temperature, do not decrease after electron irradiation. Solar cells with applied back surface reflector HEC-BSR and HEC-BSFR deliver the highest power performance at operating conditions. Author (ESA)

N80-33891# European Space Technology Center, Noordwijk (Netherlands).
A COMPARISON OF SOLAR ARRAY RADIATION DAMAGE MODELS
R. L. Crabb and J. C. Larue *In* ESA Photovoltaic Generators in Space Jun. 1980 p 141-147 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

The 1 MeV equivalent electron fluences were computed for two ESA solar arrays, operating in an eccentric and geosynchronous orbit respectively, and for another which will operate in near Earth orbit. These three cases have provided a wide coverage of the Earth's trapped proton/electron environment and, for the two orbiting arrays, have enabled comparisons to be made between results of calculations made at time of launch (1977, 1978) with those of recalculations based on the latest improvements to particle maps describing the Earth's trapped radiation environment. The sensitivity of fluence predictions to the use of previously available and current solar cell damage coefficients were also examined. Flight observations agreed well with predictions based on both new and old particle maps for the benign geosynchronous orbit; the agreement between flight data and prediction was less satisfactory for the severe eccentric orbit. Possible reasons for the latter discrepancies are discussed while comparisons between near Earth predictions and flight data are the subjects of posterity. Author (ESA)

N80-33892# Katholieke Universiteit te Leuven (Belgium). Lab. ESAT
THE INFLUENCE ON THE FRONT METAL COVERAGE FACTOR ON THE OPEN-CIRCUIT VOLTAGE OF SILICON SOLAR CELLS
J. Nijs, F. DHoore, R. Mertens, and R. VanOverstraeten *In* ESA Photovoltaic Generators in Space Jun. 1980 p 149-154 refs Sponsored in part by Nationaa Fonds voor Wetenschappelijk Onderzoek (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Three types of solar cells were fabricated and tested: N(+)P cells, high efficiency N(+)PP(+) and P(+)NN back surface

field (RSF) cells. Different front metal coverage factors on the emitter junction are used. Determining the total current-voltage characteristics of these samples by I sub sc-V sub oc measurements, the influence of the metal coverage factor on the saturation current I sub o and thus on V sub oc is found. It can be concluded that the saturation current density in the metal covered part is two to six times larger than in the oxide covered part of the cells, where the bulk component of I sub o is kept small.
Author (ESA)

N80-33893# Applied Solar Energy Corp., City of Industry, Calif.
IMPACT OF TERRESTRIAL SOLAR CELL DEVELOPMENT ON SPACE APPLICATIONS
P. A. Iles *In* ESA Photovoltaic Generators in Space Jun. 1980 p 155-160 (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Projected space missions are outlined and the cell requirements by mission type mentioned. The techniques used to produce low cost terrestrial use cells are examined for their applicability to space needs, including silicon cell fabrication, barrier formation, contact applications, coatings, and encapsulation. The most likely area for the transfer of terrestrial cell technology is in low Earth orbit missions, based on the use of the shuttle craft.
Author (ESA)

N80-33894# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
CALIBRATION OF PHOTOVOLTAIC SOLAR ELEMENTS
H. Kaase *In* ESA Photovoltaic Generators in Space Jun. 1980 p 163-165 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Three methods are described for determining the response of photovoltaic solar elements with respect to the solar spectrum at high irradiances. The methods are based on calibrated standard lamps and reference detectors. One method uses a lamp connected to a stabilized dc power supply imaged by mirrors at the entrance slit of a double monochrometer. Mounted behind the monochrometer is an aperture shaped like the solar cell. The exit slit is imaged by mirrors on a thermocouple. The second technique uses the relative spectral irradiance and the total irradiance of the solar simulator to compute the response. The use of a tunable laser as a source is mentioned. The estimated overall uncertainties for the above methods is about 4%.
Author (ESA)

N80-33895# Naval Research Lab., Washington, D. C.
PERFORMANCE OF THE SOLAR CELL EXPERIMENT ON THE NTS-2 SATELLITE
R. L. Statler, D. H. Walker, and B. J. Faraday *In* ESA Photovoltaic Generators in Space Jun. 1980 p 167-173 refs Sponsored by Navy Space Projects Office, AFAPL, and AFSC (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Fifteen solar cell experiments were placed on the NTS-2 satellite which was launched in June 1977. Each experiment consists of a series-connected module of five 2 cm x 2 cm cells. The orbit is circular at an altitude of 20,192 km and inclination of 63 deg. The illuminated I-V curve of each module is measured at sixteen points and the data transmitted in real time. The agreement between first orbit data and ground calibration is within 2 percent. Data from 941 days in orbit are presented, corrected to a standard temperature of 50 C from the actual temperature of about 105 C on the spacecraft. The equivalent 1 MeV electron fluence through a 0.030 cm coverslip is calculated to be nearly 9 x 10 to the 14th power e/sq cm at this time, and is due almost entirely to trapped electrons (99.9 percent).
Author (ESA)

N80-33896# Centre d'Etudes et de Recherches, Toulouse (France). Dept. d'Etudes et de Recherches en Technologie Spatiale.
SOLAR CELL MODELING FOR COMPUTER-AIDED GENERATOR DESIGN AND IRRADIATION DEGRADATION COMPUTATIONS
S. Mottet *In* ESA Photovoltaic Generators in Space Jun. 1980 p 177-186 refs Sponsored by Centre National d'Etudes Spatiales (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

A mathematical model for a silicon solar cell under illumination was developed. The main transport phenomena are described before and after irradiation. The current voltage characteristics were derived from the homogeneous junction transport equations. A least squares method for curve fitting is described. Results of tests with solar cells are presented which show the ability of the model to describe the experimental characteristics with a precision better than 1%.
Author (ESA)

N80-33897# Aerospace Engineering Office, Zurich (Switzerland).
ON THE DESIGN VERIFICATION OF LARGE FLEXIBLE SOLAR ARRAYS: FIRST EXPERIENCES GAINED
K. J. Zimmermann and L. Zago (Pilatus Aircraft Ltd.) *In* ESA Photovoltaic Generators in Space Jun. 1980 p 187-193 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Design verification of large flexible solar arrays requires the adaptation of the mathematical model to well defined ground tests. Design verification itself and on-orbit predictions are then provided by the updated mathematical model. Prestressed flexible solar arrays impose geometric nonlinearities. Thus, empirical correlation of mathematical models may no longer be considered feasible. This verification approach was checked on a Communications Technology Satellite (CTS) solar array Sub-Panel Assembly by Static tests. The update of the mathematical models was performed by differential sensitivity analysis algorithms applied to geometric nonlinearities, executed by a simple correlation algorithms minimizing the error in the analytical prediction. Correlation is possible to any type of measurement parameter. The study yields an updated mathematical model with a mean error of approximately 7% and a computational strategy that reduces computer cost. Further increase in the model's accuracy is possible through iteration.
Author (ESA)

N80-33898# European Space Technology Center, Noordwijk (Netherlands).
EFFICIENT THERMAL CYCLING OF SOLAR PANELS IN SOLAR SIMULATION FACILITIES WITH A MULTI-PANEL TEST RIG
P. W. Brinkmann and J. Reimann (Industrieanlagen Betriebsgesellschaft m.b.H.) *In* ESA Photovoltaic Generators in Space Jun. 1980 p 195-202 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

It is shown that efficient thermal cycling tests under vacuum can be performed at reduced costs to cover the requirements for qualifications and acceptance testing of solar panels. A suitable test rig was developed which allows simultaneous testing of up to 3 solar panels with a dimension of 1.3 m x 1.7 m each. The tests can be performed in an existing solar simulation facility with a beam diameter of only 2.4 m. This means that a close simulation of orbital conditions can be achieved, including severe eclipse conditions with rapid temperature changes. Chamber dimensions, descriptions of suspension devices, and other data needed by potential users are given.
Author (ESA)

N80-33899# British Aerospace Dynamics Group, Bristol (England).
A GENERAL PURPOSE COMPUTER PROGRAM TO ASSIST IN THE SYSTEM DESIGN OF A SOLAR ARRAY
H. R. Nye *In* ESA Photovoltaic Generators in Space Jun. 1980 p 205-210 (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

A set of computer programs to assist in the system design of solar arrays is described. The programs allow a complete analysis of solar array electrical designs to a level sufficient for classic phase A and early phase B phases of a program. Given a set of design and performance requirements, the programs generate a number of candidate sola: array designs and provide indicative performance characteristics. The programs can provide designs for most types of solar arrays, including rigid panel types, flexible fold-up types and roll-up types. The programs are primarily concerned with the electrical aspects of the design. The program concept is introduced and the interative flexibility of the design process is discussed. Examples are given.
Author (ESA)

N80-33900# Optical Coating Lab., Inc., Santa Rosa, Calif.
AN EVALUATION OF SPECTRALLY SELECTIVE REFLECTORS (COLD MIRROR MEMBRANES) FOR USE WITH CONCENTRATOR SOLAR ARRAYS
William T. Beauchamp, James D. Rancourt, and Dan R. Lott (Lockheed Missiles and Space Co., Sunnyvale, Calif.) *In* ESA Photovoltaic Generators in Space Jun. 1980 p 211-216 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA Paris FF 80

Spectrally selective reflector (SSR) coatings on lightweight transparent membranes were evaluated as a method of concentrating light for achieving increased power without suffering severe temperature losses on solar arrays. Analysis and laboratory tests indicate that SSR concentrators are more effective than opaque reflectors with both silicon and GaAs cells for increasing array output. Large area SSR membranes can be produced in roll to roll coaters at cost that will be competitive with other reflecting membranes. Author (ESA)

N80-33901# Technische Universitaet, Brunswick (West Germany). Lehrstuhl fuer Raumflugtechnik und Reaktortechnik.
PROPERTIES OF SOLAR GENERATORS WITH REFLECTORS AND RADIATORS
W. D. Ebeling, D. Rex, and U. Bierfischer *In* ESA Photovoltaic Generators in Space Jun. 1980 p 217-222 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

Radiation cooled concentrator systems using silicon and GaAs cells were studied. The principle of radiation cooling by the reflector surfaces is discussed for cylindrical parabolic reflectors (SARA), truncated hexagonal pyramids, and a small trough configuration. Beam paths, collection properties for imperfect orientation, and thermal optimization parameters were analyzed. The three concentrating systems with radiation cooling offer advantages over the plane panel and over the large trough. With silicon solar cells they exhibit considerably lower solar cell consumption per Kw and also lower mass per kW. With GaAs cells the SARA system reduces the number of solar cells needed per kW to less than 10%. Also in all other cases SARA offers the best values for alpha and F sub sol, as long as narrow angular tolerances of the panel orientation can be met. Analysis of the energy collecting properties for imperfect orientation shows the superiority of the hexagonal concetrator. This device can produce power for even large angles between the sun and the panel normal. Author (ESA)

N80-33902# Teldix Luftfahrt-Ausruestungs G.m.b.H., Heidelberg (West Germany).
BEARING AND POWER TRANSFER ASSEMBLY (BAPTA) WITH ROTARY TRANSFORMER
W. Auer *In* ESA Photovoltaic Generators in Space Jun. 1980 p 225-229 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

The utilization of rotary transformers as an alternative to slip rings for the power transfer from solar panels to a satellite's main body could be advantageous, especially if an ac bus system is taken into consideration. Different approaches for bearing and power transfer assembly (BAPTA's) with rotary transformers were investigated with main emphasis on the electromagnetic design. Test results show that a 1.5 kW transformer can be operated with a 98% efficiency. A furhter increase to the specified 99% efficiency seems to be possible. In the present configuration, two 1.5 kW transformers are mounted with in one housing. A preloaded ball bearing arrangement assures proper air gaps and a relatively constant torque over temperature. The BAPTA is driven by a TELDIX stepper motor. Author (ESA)

N80-33903# AEG-Telefunken, Wedel (West Germany).
TECHNOLOGY OF ELEVATED VOLTAGE SOLAR ARRAYS
H. Bebermeier, K. Bogus (ESTEC, Noordwijk, Netherlands), and W. Goelz (AEG-Telefunken, Kassel, West Germany) *In* ESA Photovoltaic Generators in Space Jun. 1980 p 231-237 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

A technology study and test program was conducted to assess the impact of elevated voltages on solar array design and operation. Blanket integrated protection diodes were developed, and long term elevated voltage failure modes were identified for modern solar cell blanket concepts. The most critical failure mode is the hot spot phenomenon caused by interrupted interconnectors or by partial shadows on the array. Stress/lifetime tests were conducted on 50 micrometer Kapton samples. Corona experiments were performed with solar arrays in a simulated plasma environment. It appears that the requirements for a 250 Kw Low Earth Orbit platform array can be met to a large extent by applying the proven technology of existing flexible array concepts. A major problem is the determination of the maximum tolerable operating voltage. Tests indicate that conventional concepts could become problematic above far less than 1 kV. The limiting factors are corona discharge effects, plasma leakage, and partial discharge inception which reduces, the lifetime of the array. Author (ESA)

N80-33904# European Space Technology Center, Noordwijk (Netherlands). Systems Engineering Dept.
SATELLITE POWER SYSTEMS: STATUS AND PLANNED ACTIVITIES
D. Kassing *In* ESA Photovoltaic Generators in Space Jun. 1980 p 239-244 refs (For primary document see N80-33873 24-44)
Avail: NTIS HC A12/MF A01; ESA, Paris FF 80

The general progress in satellite power system (SPS) system definition and assessment activities to date is summarized, and selected technical issues identified as being crucial for the photovoltaic solar energy conversion subsystem of the reference concept are reviewed. The requirements of the photovoltaic subsystem are discussed with respect to the alternative power transmission options studied by NASA since October 1978, particularly solid state microwave devices and laser. A summary is given of the system impact assessment and European SPS Activities. Author (ESA)

N80-33905# Department of National Defence, Ottawa (Ontario).
THE BEHAVIOR OF THE MILITARY BATTERY TYPE BB248/U USED TO START THE ENGINE OF THE A.P.C.
Louis Brossard and Lloyd Gallop Dec. 1979 28 p refs In ENGLISH; FRENCH summary
(AD-A080615; DREO-TN-79-31) Avail: NTIS HC A03/MF A01 CSCL 10/3

The performance of the lead-acid battery used to start the diesel engine in the Armoured Personnel Carrier (APC M113A1) was tested between -18 and -26 C. The lowest ambient temperature at which a start can be achieved without the assistance of slave batteries is close to -20 C provided the initial temperature of the vehicle batteries is about -15 C. The average cranking current under these conditions is approximately 450A and 13Ah are expended during a cranking period of close to 2 min. Engine starting is difficult or impossible if the terminal voltage (TV) is below 16V. The use of auxiliary batteries, connected in parallel, increases the value of the TV and the start is easier. It was demonstrated that the charge passed through batteries during a charge period of 30 to 45 min, with the alternator-regulator system varies between 6.5 and 9.5 Ah. This is markedly lower than the charge required to obtain a start. The viscosity of the lubricating oil also influences the ability to acheive an engine start at low temperatures and two synthetic Arctic Grade lubricating oils were evaluated. GRA

N80-33906# Department of National Defence, Ottawa (Ontario). Energy Conversion Div.
EVALUATION OF CRANKING CHARACTERISTICS OF COMMERCIALLY AVAILABLE BATTERIES BETWEEN ROOM TEMPERATURE AND -40 C
Louis Brossard and R. W. Gorman Dec. 1979 23 p refs In ENGLISH; FRENCH summary
(AD-A080614; DREO-TN-79-30) Avail: NTIS HC A02/MF A01 CSCL 10/3

The cranking characteristics of three brands of commercially available batteries (GROUP 24) were measured between room temperature (RT) and -40 C. They were fully recharged at RT before each discharge which was carried out at constant current corresponding to the 3 C to 4 C rates. Under the same experimental conditions, the behavior on discharge of these batteries was found to be very similar. The only significant differences observed concerned the increase in internal battery temperature resulting from a discharge. GRA

N80-33907# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio
COMPREHENSIVE PLANNING FOR PASSIVE SOLAR ARCHITECTURAL RETROFIT M.S. Thesis
Stanley H. Scofield May 1980 329 p refs
(AD-A088650; AFIT-CT-80-191) Avail: NTIS HC A15/MF A01 CSCL 13/1

This thesis proposes a new method for developing Passive Solar Architectural Retrofit Concepts to be used in Air Force Project Booklets. This method can be used for 'in-house' design projects, A E design projects, and major projects administered by Army or Navy Engineering. This thesis has three parts: A series of 35 'patterns' to be used by the Architectural Programmer and user. The recommendations contained in each 'pattern' are specific enough for the programmer and user to identify the decisions they need to make early in the programming process, and yet the recommendations are not overly restrictive to the designer. A sample Passive Solar Architectural Retrofit Program using selected 'patterns' from part one of this thesis, A sample Conceptual Design using the Architectural Program of part two of this thesis is described. GRA

N80-33908# Eagle-Picher Industries, Inc., Joplin, Mo. Electronics Div.
NICKEL-ZINC BATTERIES FOR RPV APPLICATIONS Interim Technical Report, 15 Nov. 1978 - 15 Dec. 1979
Donna Dappert Wright-Patterson AFB, Ohio AFAPL May 1980 90 p
(Contract F33615-78-C-2058; AF Proj. 3145)
(AD-A088594; AFWAL-TR-80-2050) Avail: NTIS HC A05/MF A01 CSCL 10/3

Interim results are presented for a program dealing with the placement of nickel zinc batteries in specific military applications, namely the BQM-34A and the PQM-102 Remotely Piloted Vehicles. The nickel zinc system was chosen for these applications because RPV's demand a high quality secondary battery that offers a compromise between long life (calendar and cycle) and low zinc system, calendar and cycle life testing of the two candidate batteries, qualification testing, and flight testing in operational RPV's. Test results of developmental cells and batteries include cycle life testing of various separator materials, high rate/low temperature discharges with various types of nickel electrodes, zinc electrode substrate, and charging methods. Calendar and cycle life testing is underway which will demonstrate the ability of the nickel zinc system to be routinely cycled over an extended period of time. J.M.S.

N80-33909# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
LOW-COST FLYWHEEL DEMONSTRATION PROGRAM Final Report, 1 Oct. 1977 - 31 Dec. 1979
D. W. Rabenhorst, T. R. Small, and W. O. Wilkinson Apr. 1980 111 p refs
(Contract EC-77-C-01-5085)
(CONS-5085-T2) Avail: NTIS HC A06/MF A01

All primary objectives were successfully achieved as follows: demonstration of a full-size, 1 kWh flywheel having an estimated cost in large-volume production of approximately $50/kWh; development of a ball-bearing system having losses comparable to the losses in a totally magnetic suspension system; successful and repeated demonstration of the low-cost flywheel in a complete flywheel energy-storage system based on the use of ordinary house voltage and frequency; and application of the experience gained in the hardware program to project the system design into a complete, full-scale, 30 kWh home-type flywheel energy-storage system. DOE

N80-33910# Department of Energy (US), London (England).
WORKING GROUP ON FUEL CONSUMPTION TARGETS Interim Report
27 Jun. 1979 31 p
(INP-24333) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

The UK Working Group on Fuel Consumption Targets was created in 1978 to investigate the feasibility of setting progressive targets for raising the average mpg achieved by new cars and methods of achieving these targets and to report to the Automotive Energy Consultative Group. The standards established for cars and the factors that influence the standards are discussed. Proposals for a voluntary fuel consumption targets scheme were submitted to the Working Group by representatives of the Society of Motor Manufacturers and Traders. The text of that scheme is given in annexes to the report. DOE

N80-33911# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
CLEANING AGENTS AND TECHNIQUES FOR CONCENTRATING SOLAR COLLECTORS
M. B. Sheratte May 1980 91 p refs
(Contract DE-AC04-76DP-00789)
(SAND-79-7052) Avail: NTIS HC A05/MF A01

Tests were conducted to determine the nature of the soil which is irreversibly deposited on solar collectors during environmental exposure. Methods of removing this soil were investigated. The mechanism of attachment of the soil to the surface was determined as a potential aid to cleaning agent formulation. Reflector specimens were exposed at sites in Shenandoah, GA, Albuquerque, NM, and Daggett, CA. Three types of reflector surfaces were studied: second surface silvered glass, aluminized FEK 244 film on glass substrate, and RTV 670 on aluminum. Cleaning procedures were evaluated by microscopic examination of the solid surfaces before and after cleaning and by measurement of specular reflectance. The potential effectiveness of environmental cleaning agents, much as rain, frost and snow, is discussed. DOE

N80-33912# Vector Engineering, Inc., Springfield, N. J.
RANKINE BOTTOMING CYCLE SAFETY ANALYSIS Final Report
Gordon A. Lewandowski Feb. 1980 101 p refs
(Contract DE-AC05-79ET-15445)
(DOE/ET-15445/T1) Avail: NTIS HC A06/MF A01

A safety and hazards analysis is presented of three Rankine Bottoming Cycle Systems in public utility applications: a Thermo Electron system using Fluorinal 85 (a mixture of 85 mole % trifluoroethanol and 15 mole % water) as the working fluid; a Sundstrand system using toluene as the working fluid; and a Mechanical Technology system using steam and Freon 2 as the working fluids. The properties of the working fluids considered are flammability, toxicity, and degradation, and the risks to both plant workers and the community at large are analyzed. DOE

N80-33913# Total Environmental Action, Inc., Harrisville, N.H.
DEVELOPMENT OF A SITE-FABRICATED, BUILDING INTEGRATED AIR SOLAR SYSTEM Final Report, 30 Sep. 1977 - 30 Apr. 1980
Peter Temple and Joseph T. Kohler Apr. 1980 166 p refs
(Contract DE-FG04-77CS-34123)
(ALO-4123-5) Avail: NTIS HC A08/MF A01

The results of a two year project to develop, thoroughly test, and optimize a complete site-fabricated solar air heating system are presented. The site-fabricated air collector was tested to ASHRAE 93-77 standards and the HUD 30-days stagnation test; it was found that the collector performed as well as any standard commercially manufactured air collector, but for only one-third the cost. All the available collector materials: glazings, paints, coatings, caulks, absorber plates, structural materials, and fasteners were studied. With the results of the materials study, the collector design was further optimized in terms of theoretical efficiency, ease of construction, apperance, and durability. The construction manual with step-by-step instructions, complete construction drawings, and background information on materials and design options are given. DOE

N80-33914# RCA Labs., Princeton, N. J.
PHOTOVOLTAIC MECHANISMS IN POLYCRYSTALLINE THIN-FILM SILICON SOLAR CELLS Quarterly Report, 31 May - 31 Aug. 1979
D. Redfield Sep. 1979 16 p refs
(Contract DE-AC01-79ET-23108)
(DOE/ET-23108/1; QR-1) Avail: NTIS HC A02/MF A01

Fundamental limitations on the efficiency of Si solar cells were analyzed theoretically and experimentally. Emphasis was on mechanisms limit V/sub oc/ because that is the parameter for which the greatest discrepancy exists between observation and previous theory. Analyses of heavy-doping effects and

doping gradient effects showed the past treatments of such effects were the inclusion of Auger processes essential for the saturation current J/sub o/, which dominates V/ sub oc/. An improved method for evaluating J/sub o/is given. A calculation based on this method showed that past estimates of bandgap narrowing by other methods were seriously in error. DOE

N80-33915# New England Research Application Center, Storrs, Conn.
BATTERY ELECTROLYTES. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1972 - Apr. 1980
C. Gilbert Young May 1980 215 p Sponsored in part by NTIS
(PB80-808629) Avail: NTIS HC $30.00/MF $30.00 CSCL 10C

Many types of solid, liquid and gaseous battery electrolytes are described and analyzed in the cited abstracts. Battery design, construction, and use, employing the listed electrolytes, are discussed. Battery design, construction, and use, employing the listed electrolytes, are discussed. Battery life, efficiency, and maintenance characteristics are also delineated. Included are 196 citations. GRA

N80-33916# New England Research Application Center, Storrs, Conn.
BATTERY ELECTROLYTES. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Apr. 1980
C. Gilbert Young May 1980 37 p Sponsored in part by NTIS
(PB80-808637) Avail: NTIS HC A03/MF A01 CSCL 10C

Many types of solid, liquid and gaseous battery electrolytes are described and analyzed in the cited abstracts. Battery design, construction, and use, employing the listed electrolytes, are discussed. Battery life, efficiency, and maintenance characteristics are delineated. This index contains 29 citations. GRA

N80-33917# National Technical Information Service, Springfield, Va.
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - 1978
Audrey S. Hundemann Jul. 1980 290 p
(PB80-812886) Avail: NTIS HC $30.00/MF $30.00 CSCL 10A

Citations to bibliographies, state-of-the-art reviews, and literature surveys on various aspects of fossil fuels, wind, solar energy, hydrogen, geothermal energy, nuclear energy, and batteries are presented. A few citations pertain to electric power. This updated bibliography contains 280 citations, none of which are new entries to the previous edition. GRA

N80-33918# National Technical Information Service, Springfield, Va.
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1979 - Jun. 1980
Audrey S. Hundemann Jul. 1980 117 p Supersedes NTIS/PS-79/0639; NTIS/PS-78/0586
(PB80-812894; NTIS/PS-79/0639; NTIS/PS-78/0586) Avail: NTIS HC $30.00/MF $30.00 CSCL 10A

Citations to bibliographies, state-of-the-art reviews, and literature surveys on various aspects of fossil fuels, wind, solar energy, hydrogen, geothermal energy, nuclear energy, and batteries are presented. A few citations pertain to electric power. This updated bibliography contains 107 citations, 77 of which are new entries to the previous edition. GRA

N80-33919# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
ENERGY PROGRAMS AT THE JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY Quarterly Report, Jan. - Mar. 1980
May 1980 48 p refs
(Contracts EX-76-A-36-1008; DE-A101-79ET-27025)
(PB80-195316; JHU/APL/EQR/80-1) Avail: NTIS HC A03/MF A01 CSCL 10A

Research projects dealing with the following topic areas are discussed. Geothermal energy development planning and technical assistance, operational research, hydroelectric power development, seismotectonic investigation, and energy conversion and storage techniques are among the topics covered. GRA

N80-33920# California Energy Commission, Sacramento.
URANIUM RESOURCES: A REVIEW OF ESTIMATION METHODOLOGIES Final Consultant Report
Stephen J. Sullivan May 1980 71 p refs
(PB80-193725; CAEC-50; CAEC-300-80-025) Avail: NTIS HC A04/MF A01 CSCL 10A

Several methods for estimating recoverable resources which fall into two categories. Explicit models yield the amount and distribution of uranium ore on the basis of a known physical characteristic, such as rock type. Implicit models yield resources on the basis of an historical trend, such as annual production over time. Other methods are used to estimate subeconomic deposits. None of the methods are identified, and recent resource estimates are presented. GRA

N80-33921# California Energy Commission, Sacramento.
THE POTENTIAL OF ENERGY FARMING IN THE SOUTHEASTERN CALIFORNIA DESERT Final Staff Report
Virginia Lew Apr. 1980 64 p refs
(PB80-195019; CAEC-66; CAEC-500-80-017) Avail: NTIS HC A04/MF A01 CSCL 21D

The use of energy forms to provide future sources of energy for California is considered. Marginal desert lands in southeastern California are proposed for the siting of energy farms using acacia, eucalyptus, euphorbia, guayule, jojoba, mesquite, or tamarisk. GRA

N80-33922# Office of Technology Assessment, Washington, D. C.
CONSERVATION AND SOLAR ENERGY PROGRAMS OF THE DEPARTMENT OF ENERGY: A CRITIQUE
Jun. 1980 81 p refs
(PB80-197759; OTA-E-120; LC-80-600092) Avail: NTIS HC A05/MF A01; Also available HC SOD CSCL 10A

In response to a request from the House Committee on Science and Technology, DOE's solar and conservation goals and the strategies for meeting them are reviewed. Management and institutional issues requiring DOE or Congressional attention are identified. GRA

N80-33923# National Technical Information Service, Springfield, Va.
LEAD BATTERIES. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jun. 1980
Diane M. Cavagnaro Jul. 1980 204 p Supersedes NTIS/PS-79/0780 and NTIS/PS-78/0689
(PB80-813363; NTIS/PS-79/0780; NTIS/PS-78/0689) Avail: NTIS HC $30.00/MF $30.00 CSCL 10C

The design, development, components, fabrication, chemistry, and testing of lead batteries are cited in this compilation of federally-funded research. Specific applications for spacecraft, consumer products, and electric vehicles are covered. Studies on lead recovery from battery scrap are covered. Several abstracts on lead toxicity in industrial plants are also cited. GRA

N80-33924# National Technical Information Service, Springfield, Va.
LEAD BATTERIES. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1977 - Jun. 1980
Diane M. Cavagnaro Jul. 1980 159 p Supersedes NTIS/PS-79/0782 and NTIS/PS-78/0690
(PB80-813371; NTIS/PS-79/0782; NTIS/PS-78/0690) Avail: NTIS HC $30.00/MF $30.00 CSCL 10C

Worldwide research on lead battery components, charging, corrosion, and testing is cited. The majority of studies concern battery use in electric vehicles. Studies on lead recovery from battery scrap and air pollution at battery factories are also included. GRA

N80-33816# Atmospheric Environment Service, Ottawa (Ontario). Boundary Layer Research Div.
MODIFICATION OF THE BOUNDARY LAYER BY OROGRAPHY

P. A. Taylor and P. R. Gent (National Center for Atmospheric Research, Boulder, Colo.) *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 143-165 In FRENCH (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N80-33925 National Physical Lab., Teddington (England).
A CASE STUDY OF ENVIRONMENTAL NOISE EVALUATION
R. F. Higginson and A. J. Rennie Apr. 1980 16 p refs
(NPL-AR-96; ISSN-0143-7143) Copyright.
Avail: Issuing Activity

The noise in the neighborhood of a hovercraft ferry terminus was measured and quantified using the equivalent continuous sound level, L sub eq. A number of different sources of noise are heard in the area concerned and the measurements were made for demonstration purposes. Individual components of a noise environment were evaluated and the magnitudes of individual noise events were determined by their single event noise exposure levels, L sub AX. The levels of the total noise were determined from limited measurements of the components and a noise prediction formula was established. T.M.

N80-33926*# Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
A SENSITIVITY ANALYSIS OF VOLCANIC AEROSOL DISPERSION IN THE STRATOSPHERE
Carolyn F. Butler Apr. 1979 69 p refs
(Grants NsG-1343; NsG-1477)
(NASA-CR-163606; GSTR-79-4) Avail: NTIS HC A04/MF A01 CSCL 13B

A computer sensitivity analysis was performed to determine the uncertainties involved in the calculation of volcanic aerosol dispersion in the stratosphere using a 2 dimensional model. The Fuego volcanic event of 1974 was used. Aerosol dispersion processes that were included are: transport, sedimentation, gas phase sulfur chemistry, and aerosol growth. Calculated uncertainties are established from variations in the stratospheric aerosol layer decay times at 37 latitude for each dispersion process. Model profiles are also compared with lidar measurements. Results of the computer study are quite sensitive (factor of 2) to the assumed volcanic aerosol source function and the large variations in the parameterized transport between 15 and 20 km at subtropical latitudes. Sedimentation effects are uncertain by up to a factor of 1.5 because of the lack of aerosol size distribution data. The aerosol chemistry and growth, assuming that the stated mechanisms are correct, are essentially complete in several months after the eruption and cannot explain the differences between measured and modeled results. A.R.H.

N80-33927*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TURBID WATER MEASUREMENTS OF REMOTE SENSING PENETRATION DEPTH AT VISIBLE AND NEAR-INFRARED WAVELENGTH
W. D. Morris, W. G. Witte, and C. H. Whitlock Aug. 1980 11 p refs Presented at the Symp. on Surface-Water Impoundments, Minneapolis, 2-5 Jun. 1980
(NASA-TM-81843) Avail: NTIS HC A02/MF A01 CSCL 13B

Remote sensing of water quality is dicussed. Remote sensing penetration depth is a function both of water type and wavelength. Results of three tests to help demonstrate the magnitude of this dependence are presented. The water depth to which the remote-sensor data was valid was always less than that of the Secchi disk depth, although not always the same fraction of that depth. The penetration depths were wavelength dependent and showed the greatest variation for the water type with largest Secchi depth. The presence of a reflective plate, simulating a reflective subsurface, increased the apparent depth of light penetration from that calculated for water of infinite depth. T.M.

N80-33928*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IN SITU OZONE DATA FOR EVALUATION OF THE LASER ABSORPTION SPECTROMETER OZONE REMOTE SENSOR: 1979 SOUTHEASTERN VIRGINIA URBAN PLUME STUDY SUMMER FIELD PROGRAM
Gerald L. Gregory, David S. McDougal, and Joe J. Mathis, Jr. Oct. 1980 57 p refs
(NASA-TM-81831) Avail: NTIS HC A04/MF A01 CSCL 13B

Ozone data from the 1979 Southeastern Virginia Urban Study (SEV-UPS) field program are presented. The SEV-UPS was conducted for evaluation of an ozone remote sensor, the Laser Absorption Spectrometer. During the measurement program, remote-sensor evaluation was in two areas: (1) determination of the remote sensor's accuracy, repeatability, and operational characteristics, and (2) demonstration of the application of remotely sensed ozone data in air-quality studies. Data from six experiments designed to provide in situ ozone data for evaluation of the sensor in area 1, above, are presented. Experiments consisted of overflights of a test area with the remote sensor aircraft while in situ measurements with a second aircraft and selected surface stations provided correlative ozone data within the viewing area of the remote sensor. T.M.

N80-33929# Council for Scientific and Industrial Research, Pretoria (South Africa).
INTERNATIONAL CONFERENCE ON AIR POLLUTION, VOLUME 1
25 Oct. 1979 389 p refs Conf. held at Pretoria, 22-25 Oct. 1979 4 Vol.
(ISBN-0-7988-16651) Avail: NTIS HC A17/MF A01

Various problems concerning air pollution and its effects and air pollution control are addressed. Specific topics include legislation, medical aspects, environmental planning, economic aspects, community administration, and public reaction. For individual titles, see N80-33930 through N80-33935.

N80-33930# Esso Petroleum Co. Ltd., Abingdon (England).
A PHILOSOPHY FOR CLEAN AIR
H. I. Fuller *In* CSIR Intern. Conf. on Air Pollution, Vol. 1 25 Oct. 1979 12 p (For primary document see N80-33929 24-45)
Avail: NTIS HC A17/MF A01

The social, economic, and health problems associated with air pollution and its control are briefly reveiwed and the values which influence the ways these problems are confronted are identified. Possible reasons for the present present preoccupation with the environment are suggested and some of the more significant implications for modern society are considered. It is suggested that there is a growing need for a wide-looking philosophy in which social expectations and technical capability for achieving clean air find their proper perspective in the spectrum of social improvement. M.G.

N80-33931# Medical Research Council, London (England).
CLEAN AIR AND HEALTH IN BRITAIN IN THE 1970'S
R. E. Waller *In* CSIR Intern. Conf. on Air Pollution, Vol. 1 25 Oct. 1979 15 p refs (For primary document see N80-33929 24-45)
Avail: NTIS HC A17/MF A01

Parallels between the reduction of air pollution in Great Britain and public health are reported. A dramatic change has already been seen in London and in other large cities in Britain in terms of acute effects of pollution. The very high concentrations of smoke and sulphur dioxide that used to occur during temperature inversions have virtually disappeared, and there is no longers any evidence of the sudden increases in mortality and morbidity that used to be associated with them. There are encouraging signs too in terms of chronic effects, with a tendency for bronchitis death-rates to decline, particularly in London. The results of surveys of respiratory symptoms and lung function show no more than a marginal effect of present day levels of smoke and SO2, but there are still many people in the community who grew up through the highly polluted conditions in the past, and who may still have residual effects. M.G.

N80-33932# Electricity Commission of New South Wales, Sydney (Australia). Power Div.

COLLECTING FLY ASH FROM LOW SULPHUR COALS: AN OVERVIEW OF AUSTRALIAN EXPERIENCE

K. S. Watson *In* CSIR Intern. Conf. on Air Pollution, Vol. 1 25 Oct. 1979 11 p (For primary document see N80-33929 24-45)

Avail: NTIS HC A17/MF A01

The performance and costs of precipitators and fabric filters when used with pulverized coal or spreader stoker fired boilers are compared. Economic consideration tend to favor fabric filters as target collection efficiency increases, particularly is fly ash of poor reduced plant availabilty due to premature bag failure from physical breakdown or from blinding increases in an unpredictable manner. Where lower collection efficnecy is adeaute or where conditions fabor precipitation both capital and operating and maintenance charges are likely to put precipitators ahead on cost. M.G.

N80-33933# Florida State Univ., Tallahassee. Dept. of Oceanography.

LUNG DEPOSITION OF AEROSOLS FROM INDUSTRIAL ENVIRONMENTS

S. Bauman, J. W. Winchester, H. J. Annegarn (Witwatersrand Univ.), and A. C. D. Leslie *In* CSIR Intern. Conf. on Air Pollution, Vol. 1 25 Oct. 1980 13 p refs Sponsored in part by National Inst. of Environmental Health Sciences and EPA (For primary document see N80-33929 24-45)

Avail: NTIS HC A17/MF A01

Test results are reported on an several aerosol sampling system for exhaled human breath, to determine the respiratory deposition curve of the heavy metal components of the aerosol. Simultaneous sampling of inhaled ambient aerosol and exhaled breath aersool by cascade impactors and elemental analysis by particle induced X-ray emission permits determination of particle deposition in the range < 0.25 to >4 microns aerodynamic diameter. Results are reported using the apparatus in a welding shop, showing how the deposition varies with the particle size and how the precision determining percent deposition depends on sampling conditions. It is noted that the application of mining environments would permit measurements to be made on minera at work. M.G.

N80-33934# DeHeurtley (Graciela L.), Buenos Aires (Argentina).

METHODOLOGY FOR THE RESEARCH OF AIR POLLUTION IN URBAN AREAS

Graciela L. deHeartley *In* CSIR Intern. Conf. on Air Pollution, Vol. 1 25 Oct. 1979 12 p (For primary document see N80-33929 24-45)

Avail: NTIS HC A17/MF A01

A methodology to research air pollution in urban areas is developed which is aimed at supplying a standard tool for comparison for separate investigations. A number of urban constants are identified including the placement of building masses, the detection of central city areas, the percentage of soil areas, and the placement of residential areas. Factors which determine the micro and mesoclimates are also outlined. M.G.

N80-33935# Department of Health, Johannesburg (South Africa).

THE ASSESSMENT OF SMOKE EMISSION FROM DIESEL-ENGINED VEHICLES

L. E. Tucker *In* CSIR Intern. Conf. on Air Pollution, Vol. 1 25 Oct. 1979 8 p (For primary document see N80-33929 24-45)

Avail: NTIS HC A17/MF A01

The enforcement of diesel vehicle emission control laws is briefly addressed and an assessment measuring techniques is given. The free acceleration method for determining the density of exhaust emissions from diesel engines is found to have serious shortcomings. Various on load methods are suitable as alternatives. The use of a wheel dynamometer, a set of free running rollers, or a road test are all satisfactory methods. Dynamometer testing is recommended for the larger local authorities and a comparable road test for small municipalities. M.G.

N80-33936# Council for Scientific and Industrial Research, Pretoria (South Africa).

INTERNATIONAL CONFERENCE ON AIR POLLUTION, VOLUME 2

25 Oct. 1979 297 p refs Conf. held at Pretoria, 22-25 Oct. 1979 4 Vol.

(ISBN-0-7988-1665-1; ISBN-0-7988-1668-6) Avail: NTIS HC A13/MF A01

Methods to control air pollution from industrial sources are discussed. Electrostatic precipitators, dust collectors, wet scrubbers, and venturi tubes are among the topics considered. For individual titles, see N80-33937 through N80-33942.

N80-33937# Chemical Engineering Research Group, Pretoria (South Africa).

THE PREVENTION OF DUST EMISSIONS IN SOUTH AFRICA BY ELECTROSTATIC PRECIPITATION

D. Heinichen *In its* Intern. Conf. on Air Pollution, Vol. 2 25 Oct. 1979 19 p refs (For primary document see N80-33936 24-45)

Avail: NTIS HC A13/MF A01

The application of electrostatic precepitators in the prevention of air pollution by the South African power generating plants and by the process industries is reviewed. Current problems affecting availability and efficiency of the precipitators are pinpointed. These include variations in the characteristics of coal and other raw materials, plant design and maintenance, instrumentation and operator skills. J.M.S.

N80-33938# Cape Town Univ. (South Africa). Dept. of Mechanical Engineering.

FLUIDIZED-BED COMBUSTION FOR POLLUTION CONTROL

D. P. Naude and R. K. Dutkiewicz *In* CSIR Intern. Conf. on Air Pollution, Vol. 2 25 Oct. 1979 14 p refs (For primary document see N80-33936 24-45)

Avail: NTIS HC A13/MF A01

Fluidized bed combustion is described as a means of raising steam for electricity power generation and for industrial purposes. With this combustion technique, poor quality fuels can be utilized. However, fluidized bed combustion also enables the reduction of atmospheric pollutants. The use of fluidized beds for restricting particulate emissions as well as for reducing emissions of sulphur and nitrogen oxides is reviewed. Some results on particulate emissions from both a 300 mm and a 1000 mm diameter test rig are presented to illustrate the size of particulates resulting from fluidized bed combustion. A brief description of a 100 mm diameter test rig for enabling pollution studies to be undertaken is described. Fluidized bed combustors offer a simple means of meeting stringent pollution requirements. J.M.S.

N80-33939# Phillips Carbon Black Co. Ltd., Port Elizabeth (South Africa).

ENERGY CONSERVATION-AIR POLLUTION ABATEMENT PROJECT

A. L. Mcl. Baillie *In* CSIR Intern. Conf. on Air Pollution, Vol. 2 25 Oct. 1979 9 p (For primary document see N80-33936 24-45)

Avail: NTIS HC A13/MF A01

An incineration project to eliminate the H2S from the effluent gasses of carbon black plants is described. A shift in focus to conversion of the waste heat in the incineration process to useful energy in the form of steam/electricity is discussed. The electricity generated in the energy conversion project is sufficient for the process needs of the carbon black plants as well as enough to sell to a neighboring industry. J.M.S.

N80-33940# Monsanto Europe S.A., Louvain-La-Neuve (Belgium).

CURRENT TECHNIQUES FOR THE ELIMINATION OF AIRBOURNE MISTS AND SOLUBLE SOLIDS

A. F. Joseph and B. Wisniewski *In* CSIR Intern Conf. on Air Pollution, Vol. 2 25 Oct. 1979 8 p (For primary document see N80-33936 24-45)

Avail: NTIS HC A13/MF A01

Removal of mists from the effluent gasses of industrial plants is considered. Methods discussed include settling chambers, dry cyclones, wet scrubbers, electrostatic precipitators, impingement separators, and fiber bed mist eliminators. J.M.S.

N80-33941# Council for Scientific and Industrial Research, Pretoria (South Africa).

PROGRESS WITH A NEW VELOCITY ELECTRIC PRECIPITATOR THE ELECTRO-DYNAMIC VENTURO (EDV)

J. F. Vicard (Societe Lab., Lyon) *In its* Intern. Conf. on Air Pollution, Vol. 2 25 Oct. 1979 10 p refs (For primary document see N80-33936 24-45)
Avail: NTIS HC A13/MF A01

The electrodynamic venturi technique (EDV) is a unique combination of electrostatic precipitation and venturi scrubbing in the same apparatus. Practical results on small and large scale commercial systems are presented. High efficiency on submicronic particles, the low energy requirements, and simple operation are among the factors discussed. Basic phenomena of the EDV process are discussed. J.M.S.

N80-33942# Impala Platinum Ltd. (England).
A METHOD FOR ROUTINE ISOKINETIC DUST SAMPLING
J. A. Dreyer and M. Dumka *In* CSIR Intern. Conf. on Air Pollution, Vol. 2 25 Oct. 1979 13 p refs (For primary document see N80-33936 24-45)
Avail: NTIS HC A13/MF A01

A simple, reliable method for isokinetic dust sampling of gas ducts and stacks on a routine basis is described. A null probe is used to derive dust loadings expressed in terms of mass per unit time. J.M.S.

N80-33943# Council for Scientific and Industrial Research, Pretoria (South Africa).
INTERNATIONAL CONFERENCE ON AIR POLLUTION, VOLUME 3
25 Oct. 1979 373 p refs Conf. held in Pretoria, 22-25 Oct. 1979 4 Vol.
(ISBN-0-7988-1665-1; ISBN-0-7988-1667-8) Avail: NTIS HC A16/MF A01

Various aspects of energy technology are considered in terms of their environmental implications. Particular attention is given to the monitoring and control of industrial pollutants in the atmosphere as well as the utilization of wastes as an energy alternatives. For individual titles, see N80-33944 through N80-33953.

N80-33944# Council for Scientific and Industrial Research, Pretoria (South Africa). Air Pollution Research Group.
THE DETERMINATION OF TIN OXIDE IN AIRBORNE DUST
R. B. Wells *In its* Intern. Conf. on Air Pollution, Vol. 3 25 Oct. 1979 8 p refs (For primary document see N80-33943 24-45)
Avail: NTIS HC A16/MF A01

The geochemical technique of fusing stannic oxide with ammonium iodide to form volatile stannic iodide was adapted to air pollution needs. The technique yielded an extract which is to be analyzed by flame AA and is sensitive enough for use in industrial situations. R.C.T.

N80-33945# Chemical Engineering Research Group, Pretoria (South Africa).
DEVELOPMENTS IN INDUSTRIAL EMISSION MEASUREMENTS: PROGRESS TOWARDS AN AUTOMATED ISOKINETIC SAMPLER
A. T. DeReus and D. Heinichen *In its* Intern. Conf. on Air Pollution, Vol. 3 25 Oct. 1979 21 p refs (For primary document see N80-33943 24-45)
Avail: NTIS HC A16/MF A01

Some advances were made towards automatic isokinetic sampling by utilizing the relationship between internal and external static pressures of the sampling probe head as well as the duct static pressure. Placement of the external static pressure tapping in the wake region of a probe head with special geometry resulted in an improved pressure signal insensitive to normal deviations in probe alignment. R.C.T.

N80-33946# Council for Scientific and Industrial Research, Pretoria (South Africa).
AN IMPROVED METHOD FOR THE DETERMINATION OF ARSENIC AND ITS USE FOR AIR POLLUTION STUDIES
R. B. Wells *In its* Intern. Conf. on Air Pollution, Vol. 3 25 Oct. 1979 12 p refs (For primary document see N80-33943 24-45)
Avail: NTIS HC A16/MF A01

The role of inorganic arsenic as an air pollutant is briefly discussed with particular attention to possible difficulties in sampling volatile compounds of arsenic and the trapping of such species in alkaline media. Arsenic in 0.1 N sodium hydroxide or sodium carbonate can be analyzed by furnace AA without acidification. At ashing temperatures of up to 1,200 C these alkaline matrices retain arsenic in the furnace slightly better than nickel in acid solution. A sensitivity of 9 pg per 0.0044 absorbance and a detection limit of 23 pg were obtained without the use of an electrodeless discharge lamp. R.C.T.

N80-33947# Council for Scientific and Industrial Research, Pretoria (South Africa). Air Pollution Research Group.
MEASUREMENTS OF CARBON MONOXIDE IN THE SOUTHERN HEMISPHERE
E. C. Halliday, W. Seiler, and E. Brunke *In its* Intern. Conf. on Air Pollution, Vol. 3 25 Oct. 1979 11 p refs (For primary document see N80-33943 24-45)
Avail: NTIS HC A16/MF A01

The atmosphere of the Southern Hemisphere covered by the Southern Atlantic Ocean was measured for its carbon dioxide content. The results of measurements obtained during the eighteen month study are presented. R.C.T.

N80-33948# Council for Scientific and Industrial Research, Pretoria (South Africa). Air Pollution Research Group.
REMOTE SOUNDING TECHNIQUES APPLIED TO MESOCLIMATE MEASUREMENTS
R. L. Closs *In its* Intern. Conf. on Air Pollution, Vol. 3 25 Oct. 1979 13 p (For primary document see N80-33943 24-45)
Avail: NTIS HC A16/MF A01

Pollution arising from isolated evaluated sources under the climatic conditions of the Eastern Transversal is described. Some of the special climate measurements required to estimate ground level pollution concentration are considered. R.C.T.

N80-33949# Council for Scientific and Industrial Research, Pretoria (South Africa). Air Pollution Research Group.
ASPECTS OF THE INTERACTION AMONG SOME OF THE PARAMETERS OF IMPORTANCE TO POLLUTION POTENTIAL CONSIDERATIONS
H. M. Langenberg, R. L. Closs, and G. P. N. Venter *In its* Intern. Conf. on Air Pollution, Vol. 3 25 Oct. 1979 15 p refs (For primary document see N80-33943 24-45)
Avail: NTIS HC A16/MF A01

Some aspects of the interaction among the parameters are discussed with the aid of observations of wind and temperature structures in the first few hundred metres of the atmosphere over complex topography. It is shown that the interaction between the thermally driven surface winds and the upper or pressure gradient flows represents an extremely complex phenomenon and that upward or downward extrapolations of the winds should be approached with great caution. R.C.T.

N80-33950# City Council of Cape Town (South Africa). Electricity Dept.
MUNICIPAL REFUSE AS A FUEL FOR POWER GENERATION
B. D. Ives *In* CSIR Intern. Conf. on Air Pollution, Vol. 3 25 Oct. 1979 16 p refs (For primary document see N80-33943 24-45)
Avail: NTIS HC A16/MF A01

The utilization of municipal refuse as a fuel by various power generating authorities was investigated. The economic and practical aspects of burning refuse were considered together with the solutions adopted for overcoming the serious problems initially experienced. R.C.T.

N80-33951# Associated Octel Co. Ltd., Bletchley (England). Engine Lab.
ENERGY: CAREFUL CONSERVATION OR REGULATED WASTE
P. L. Dartnell *In* CSIR Intern. Conf. on Air Pollution, Vol. 3 25 Oct. 1979 25 p refs (For primary document see N80-33943 24-45)
Avail: NTIS HC A16/MF A01

The progress of the passenger car power unit in the form of the spark ignition engine and possible development of this engine in the future is discussed with respect to alternative forms of power units. The demand of environmental considerations particularly as they apply to control of exhaust emissions in

various areas of the world are considered against the methods of control and the background of penalties incurred in fuel consumption. The reasons for excessively stringent regulations for vehicle exhaust emissions are challenged in relation to more moderate control which will permit optimizing both the engine and the production of the fuel supply for maximum energy utilization. R.C.T.

N80-33952# City of Port Elizabeth (South Africa).
UTILIZATION OF MUNICIPAL REFUSE AS AN ENERGY SOURCE
R. J. Lawrence *In* CSIR Intern. Conf. on Air Pollution, Vol. 3 25 Oct. 1979 13 p (For primary document see N80-33943 24-45)
Avail: NTIS HC A16/MF A01

The utilization of municipal wastes for energy purposes is considered as a possible alternative to the shortage and high cost of traditional fossil fuels. Specific emphasis is given to examining the past and future developments of this aspect of energy technology. R.C.T.

N80-33953# Natal Univ., Pietermaritzburg (South Africa). Dept. of Mechanical Engineering.
THE USE OF SOLAR ENERGY FOR COOKING
N. Tully and A. G. Lawrence *In* CSIR Intern. Conf. on Air Pollution, Vol. 3 25 Oct. 1979 30 p refs (For primary document see N80-33943 24-45)
Avail: NTIS HC A16/MF A01

The background of the fuel and ecological crisis is reviewed with respect to the availability of solar energy. Particular attention is given to the possible widespread adoption of solar cooking among the rural African population. Various types of solar cookers are discussed with emphasis on the open concentrator employing the spherical cast iron cooking pot. The performance of this design under variable conditions of misalignment, solar insolation, wind velocity, etc. is given. Successful initial field trials are described. R.C.T.

N80-33954# Council for Scientific and Industrial Research, Pretoria (South Africa).
INTERNATIONAL CONFERENCE ON AIR POLLUTION, VOLUME 4
25 Oct. 1979 246 p refs Conf. held in Pretoria, 22-25 Oct. 1979 4 Vol.
Avail: NTIS HC A11/MF A01

Electrostatic precipitators, aerosol concentration determination, and air quality monitoring systems are discussed. Other topics include air quality simulation models and a review of the industrial role in pollution control. For individual titles, see N80-33955 through N80-33960.

N80-33955# Council for Scientific and Industrial Research, Pretoria (South Africa).
ENVIRONMENT: THE ENERGY CONNECTION
H. Brown *In its* Intern. Conf. on Air Pollution, Vol. 4 25 Oct. 1979 16 p refs (For primary document see N80-33954 24-45)
Avail: NTIS HC A11/MF A01

The adoption and maintenance of environmental controls is a costly exercise. In many cases it is necessary to use extra energy for afterburning and manufacture of new plants and equipment. This is particularly true in the case of electricity generating stations, cement works, steelworks, and control of motor car exhaust gases. The vast number of emissions from low level chimneys in energy, cash to the user and the general public. It is increasingly evident that the benefits cannot be assessed solely in monetary terms in view of the important need to conserve energy stocks and improve the health of all people. E.D.K.

N80-33956# Sturtevant Gas Cleaning Ltd., London (England).
OPERATING EXPERIENCES WITH IMPROVED RAPPING ON ELECTROSTATIC PRECIPITATORS TREATING FLY ASH FROM HIGH AND LOW SULPHUR COALS
K. H. Pearson *In* CSIR Intern. Conf. on Air Pollution, Vol. 4 25 Oct. 1979 27 p refs (For primary document see N80-33954 24-45)
Avail: NTIS HC A11/MF A01

A unique design of multilevel rapping for precipitator collecting electrodes is described, together with the reasons for its development. Operational and reliability data of installations using the system is given, covering a 12 year period. Case histories of the adoption of the system to significantley upgrade existing precipitators are discussed. Author

N80-33957# Witwatersrand Univ., Johannesburg (South Africa).
BACKGROUND AEROSOL CONCENTRATIONS FOR THE NAMIB-ATLANTIC INTERFACE
H. J. Annegarn, R. E. VanGrieken (Antwerp Univ., Belgium), J. W. Winchester (Florida State Univ., Tallahassee), J. P. F. Sellschop, and F. VonBlottnitz (Namib Research Inst., South-West Africa) *In* CSIR Intern. Conf. on Air Pollution, Vol. 4 25 Oct. 1979 18 p refs Sponsored in part by NATO, NIH and NSF (For primary document see N80-33954 24-45)
Avail: NTIS HC A11/MF A01

The time varying concetrations of eith heavy elements (Si, S, Cl, K, Ca, Ti, Fe, and Br) were determined for aerosols collected in the Nimib desert at Gobabeb, and at Swakopmund on the Atlantic coast. The samples were collected using streaker filters and analyzed by proton induced X-ray emission. The elemental concetrations at three hour intervals, together with temperature, humidity, and wind data are analyzed by multivariate statistics and factor analysis, allowing characterization of Southern Hemisphere background aerosols in maritime and continental air masses. An episode of clean continental air is identified, allowing a background value for condensation mode sulfur aerosol to be calculated. From the sulfur meteorological data correlations, inferences on the atmospheric sulfur conversion chemistry are made. E.D.K.

N80-33958# Monitor Labs., Inc., Calif.
AMBIENT AIR QUALITY MONITORING SYSTEMS: STATE OF THE ART
A. Budd and M. S. Turnbull (Syscom Instrumentation Ltd., Benoni, South Africa) *In* CSIR Intern. Conf. on Air Pollution, Vol. 4 25 Oct. 1979 12 p (For primary document see N80-33954 24-45)
Avail: NTIS HC A11/MF A01

Current analysis techniques for airborne gaseous/vapor pollutants measuring in the low parts per billion range are reviewed. The accuracy, interference susceptibility, repeatability, and reliability of such equipment are emphasized. It is necessary for this equipment to be calibrated regularly, automatically, and to a known standard. Other parameters such as meteorological components must be monitored since these greatly influence the conected data. E.D.K.

N80-33959# Council for Scientific and Industrial Research, Pretoria (South Africa).
POSSIBILITIES AND LIMITATIONS OF DIFFERENT TYPES OF DISPERSION MODELS WITH RESPECT TO AIR QUALITY MANAGEMENT
B. Gutsche (Freie Univ.) and P. Zib *In its* Intern. Conf. on Air Pollution, Vol 4, 25 Oct. 1979 23 p refs (For primary document see N80-33954 24-45)
Avail: NTIS HC A11/MF A01

The requirements of an air quality management system necessitated the development of a modular system of dispersion models as prognostic instruments. Elementary conceptions and first results for the coupled micro and urban scale dispersion of automotive emissions are presented. E.D.K.

N80-33960# American Air Filter Co., Inc., Louisville, Ky.
ENVIRONMENTAL AIR QUALITY CONTROL FROM THE INSIDE LOOKING OUT
Edwin B. Fieldhouse *In* CSIR Intern. Conf. on Air Pollution, Vol. 4 25 Oct. 1979 29 p (For primary document see N80-33954 24-45)
Avail: NTIS HC A11/MF A01

A clear understanding of and an analytical solution to the problems associated with pollution control requires a quantitative definition of pollution problems. Pollution reuction strategies based on material and energy flow information must be devised in order to improve plant or product system efficieny. Realisitic pollution control policies need to be established to meet conflicting goals such as employee demands, management guidelines, and government regulations. An understanding of what technology

can and cannot contribute toward the maintenance of a healthy environment is also required. E.D.K.

N80-33961# Council for Scientific and Industrial Research, Pretoria (South Africa).
THE TRANSFER OF POLLUTANTS IN TWO SOUTHERN HEMISPHERIC OCEANIC SYSTEMS
C. E. Cloete, ed. Oct. 1979 198 p refs Workshop held at Plettenberg Bay, South Africa, 23-26 Apr. 1979
(Rept-39; ISBN-0-7988-1649-X) Avail: NTIS HC A09/MF A01

Available information on the sources and principal routes by which pollutants enter the sea around southern Africa is summarized. The importance of different physical, chemical and biological processes is discussed in relation to the transfer of pollutants into and between the Agulhas and the Benguela oceanic systems around southern Africa. The two systems serve as examples of an oceanic current and an upwelling system. Extrapolations are drawn, as far as possible, to the rest of the Southern Hemisphere and similar conditions elsewhere. The major pollutant types discussed include petroleum hydrocarbons, toxic elements, organic wastes, halogenated hydrocarbons, radioactive materials and heat. Processes involved in the transfer of pollutants to the sea, transfer across watermass boundaries and interface transport processes are discussed. The relative importance of different processes is assessed, gaps in knowledge are identified and recommendations are made for future research. T.M.

N80-33962# National Research Inst. for Oceanology, Stellenbosch (South Africa).
A THREE DIMENSIONAL FINITE DIFFERENCE MODEL OF THE TRANSPORT OF SUSPENDED SEDIMENT
J. M. C. Nicholson Nov. 1979 105 p refs
(CSIR-RR-359; ISBN-0-7988-1562-0) Avail: NTIS HC A06/MF A01

A three dimensional, mathematical model of the transport of suspended sediment was developed which, in conjunction with a bed load model, can be used to predict the deposition and erosion patterns associated with coastal and fluvial structures. The proposed model, which is described herein, employs a semi-implicit, finite difference approach to solve the diffusion advection equation for suspended sediment transport. The advection process is solved explicitly, the vertical diffusion process is solved explicitly. Longitudinal diffusion is neglected. Author

N80-33963# Committee on Environment and Public Works (U. S. Senate).
THE STATUS OF ENVIRONMENTAL ECONOMICS: AN UPDATE
Joseph P. Bimek Washington GPO 1979 467 p refs Rept. presented to the Comm. on Environ. and Public Works, 96th Congr., 2nd Sess., Jul. 1979 Prepared by Congressional Research Service, Library of Congress
(GPO-48-402) Avail: SOD

The data base for economic evaluations of environmental issues is examined. Emphasis is placed on resolving or at least diminishing the conflicting assertions about the incompatibility of environmental quality with other important goals. Numerous types of studies are considered. These include costs of pollution control, macroeconomic assessments, microeconomic assessments, international cost comparisons, benefit-cost analyses, and cost effectiveness studies. J.M.S.

N80-33964# Committee on Science and Technology (U. S. House).
LOW-LEVEL IONIZING RADIATION
Washington GPO 1979 881 p refs Hearings before the Subcomm. on Energy Res. and Production and the Subcomm. on Nat. Resources and Environ. of the Comm. on Sci. and Technol., 96th Congr., 1st. Sess., no. 41, 13-15 Jun. 1979
(GPO-50-084) Avail: SOD

The current policies and the state of knowledge concerning low level ionizing radiation are examined. Emphasis is placed on the radiation risk issue. Other topics discussed include the possible need for expanded radiation monitoring and radiation health effects research, laboratory and epidemiological studies on radiation exposure and associated biological effects, and low level radiation exposure attributed to the nuclear fuel cycle and other energy sources. J.M.S.

N80-33965# Center for the Environment and Man, Inc., Hartford, Conn.
THE PERTURBATION OF SOME ATOMSPHERIC MECHANISMS BY EMISSIONS FROM AIRCRAFT Final Report
G. D. Robinson Nov. 1979 105 p refs
(Contract DOT-FA77WA-4055)
(AD-A089100; CEM-4232-667; FAA-EE-80-16) Avail: NTIS HC A06/MF A01 CSCL 04/1

The logical basis of the equations which are solved numerically in models of atmospheric structure and composition is examined, with the conclusion that even the most advanced examples must be regarded as empirical devices to be judged by results (some of which are impressive). The question of possible change of climate resulting from aircraft propulsion emissions into the high atmosphere is briefly reviewed. It is concluded that in the foreseen future, any impact of high altitude commercial flight on climate will be very small and not detectable against the background of natural fluctuations. Measurements of the water vapor content of air in the upper troposphere and lower stratosphere are reviewed. They are interpreted to indicate that significant upward movement of air through a pressure level of about 100 mb, by processes of any scale, occurs only in equatorial latitudes, but they leave uncertain the mechanism of the upward transfer. Using this hypothesis, the mass balance of the nitrogen species is calculated and differences in the results of various modeling procedures are exposed. Two phenomena peculiar to the immediate wake of the aircraft are very briefly considered. The first is the possible rapid conversion of NO to HNO3 in the hot highly concentrated exhaust. The second is formation of condensation trails. It is suggested that in neither problem can an investigation be profitably reopened at this time. GRA

N80-33966# Federal Aviation Administration, Washington, D. C. Office of Environment and Energy Office.
WASHINGTON NATIONAL AIRPORT FLIGHT EXTENSION TEST. NOISE MONITORING DATA REPORT Final Report
James R. Hare, Jr. and David W. Ford May 1980 103 p ref
(AD-A089111; FAA-EE-80-25) Avail: NTIS HC A06/MF A01 CSCL 01/2

This report summarizes noise measurements obtained during the Washington National Airport Flight Extension Test conducted during the summer of 1979. During this test, south departing turbojet aircraft were directed to fly over the Potomac River corridor an additional five miles prior to being directed toward their destinations. Monitoring sites were set up in the affected areas to determine the effect of the change in operations on the ambient noise levels. Equivalent noise levels (Leq) were obtained on an hourly basis and averaged for each site. The results show no statistically significant change in averaged equivalent noise levels at three sites. Significant decreases in Leq were recorded at four sites and five of the twelve sites observed some statistically significant increase in equivalent sound levels. Maximum levels (dBA) were also recorded for single aircraft events. The average maximum noise levels for the single event, during the afternoon period at Accokeek Park, for example, increased from 6.5 dB(A) to 13.5 dB(A) over the normal operational levels, varying with aircraft type. This increase in maximum levels, combined with the increased number of overflights (from 0 to 5 per hour before to 15 to 20 per hour during the test period) produced the increase in average equivalent noise levels in the southern region of the affected area. GRA

N80-33967# Noah (J. Watson) Associates, Inc., Falls Church, Va.
IMPLICATIONS OF REQUIRING NEW PRODUCTION OF OLDER AIRCRAFT TYPES (LESS THAN 75,000 POUNDS) TO MEET AMENDED NOISE STANDARDS Final Report
C. F. Day, E. D. Studholme, and J. C. Jones Jun. 1980 60 p
(Contract DOT-FA78WA-4192)
(AD-A088577; DFR-1472-FAA) Avail: NTIS HC A04/MF A01 CSCL 13/2

Implication of requiring new production of older business jets to meet noise standards are examined. Most current production business jets are well below these standards. Except for reengineering, application of known technology will not lead

to significant noise reductions. Reengineering appears to be impractical since use of an available alternative engine would have a major impact on aircraft performance and mission characteristics. Significant reductions in noise footprint can be achieved by means of noise abatement flight procedures. Use of new production models of these aircraft in the post 1985 time period is not expected to have major community noise impacts particularly at airports with 50 or more air carrier departures per day. S.F.

N80-33968# Naval Research Lab., Washington, D. C.
BATCH PROCESSING WITH THE RADIOIODINE LASER INDUCED-FLUORESCENCE DETECTOR
J. R. McDonald and A. P. Baronavski 27 Aug. 1980 19 p refs
(AD-A088773; NRL-MR-4301) Avail: NTIS HC A02/MF A01 CSCL 20/5

The Chemistry Division of the Naval Research Laboratory in cooperation with the Department of Energy has carried out research related to the detection and monitoring of airborne I2-129. Methods for conversion of alkyl Iodides and HI to I2 were quantitatively evaluated for use in batch processing. Scrubbing properties of silver zeolites in terms of their affinity for I2 and NO2 and chemical and thermal desorption curves were studied and evaluated for use in batch processing. T.M.

N80-33969# Los Alamos Scientific Lab., N. Mex.
PRELIMINARY STUDY OF THE POTENTIAL ENVIRONMENTAL CONCERNS ASSOCIATED WITH SURFACE WATERS AND GEOTHERMAL DEVELOPMENT OF THE VALLES CALDERA
G. J. Langhorst Jun. 1980 16 p refs
(LA-8398-MS) Avail: NTIS HC A02/MF A01

A preliminary evaluation is presented of possible and probable problems that may be associated with hydrothermal development of the Valles Caldera known geothermal resource area (KGRA), with specific reference to surface waters. Because of the history of geothermal development and its associated environmental impacts, this preliminary evaluation indicates the Valles Caldera KGRA will be subject to these concerns. Although the exact nature and size of any problem that may occur is not predictable, the baseline data accumulated so far have delineated existing conditions in the streams of the Valles Caldera KGRA. Continued monitoring will be necessary with the development of geothermal resources. Further studies are also needed to establish guidelines for geothermal effluents and emissions. DOE

N80-33970# JRB Associates, McLean, Va.
CONTROLLING HAZARDOUS WASTES RESEARCH SUMMARY
Mark Schaefer, ed. Mar. 1980 28 p refs
(Contract EPA-68-01-4839)
(PB80-194202; EPA-600/8-80-017) Avail: NTIS HC A03/MF A01 CSCL 13B

This brochure contains a concise description of EPA's hazardous wastes research program. The 3 part discussion focuses on hazardous wastes identification, emergency response, and long-term control technologies. GRA

N80-33971# California Inst. of Tech., Pasadena. Environmental Quality Lab.
ASSESSMENT OF ALTERNATIVE STRATEGIES FOR SLUDGE DISPOSAL INTO DEEP OCEAN BASINS OFF SOUTHERN CALIFORNIA Final Report
George A. Jackson, Robert C. Y. Koh, Norman H. Brooks, and James J. Morgan Sep. 1979 271 p refs Sponsored in part by Ford Foundation, N.Y. Rockefeller Foundation, N.Y. and Los Angeles/Orange County Metropolitan Area Project, Whittier, Calif.
(PB80-192990; EQL-14) Avail: NTIS HC A12/MF A01 CSCL 13B

The assessment of various strategies for ocean disposal of digested sewage sludge is presented. The Southern California Bight is discussed. GRA

N80-33972# Acurex Corp., Mountain View, Calif.
AIR POLLUTION CONTROL DEVICE CONFIGURATIONS Final Consultant Report
Mar. 1980 48 p refs
(PB80-193253; CAEC-59; CAEC-300-80-003) Avail: NTIS HC A03/MF A01 CSCL 13B

An analysis of data air pollutant abatement schemes for possible use on coal-fired electric generating plants is presented. Emphasis is placed on the effects of the arrangement of the control components, namely the baghouse, selective catalytic reduction and flue gas desulfurization units. Three basic configurations were identified as workable arrangements. The configurations were analyzed with respect to their capital, operating and maintenance cost impacts, reliability implications, and overall system removal efficiencies. Since there is no actual experience reported for these configurations with coal fired boilers, reliability and overall efficiency estimates were described qualitatively. GRA

N80-33973# Acurex Corp., Mountain View, Calif.
ASSESSMENT OF H2S CONTROL TECHNOLOGIES FOR GEOTHERMAL POWER PLANTS Final Consultant Report
Feb. 1980 123 p refs
(PB80-193709; CAEC-57; AEC-300-80-004) Avail: NTIS HC A06/MF A01 CSCL 13B

Several technologies for controlling hydrogen sulfide (H2S) emissions from power plants are examined. The Hydrogen Peroxide Combination System, Stretford System, and possibly EIC or Coury upstream controls appear capable of compliance with the emission limitations of 100 grams per hour per gross megawatt in 1980 at the Geysers Dry stream field in Northern California. Potential controls for stacking are: (1) upstream abatement, (2) automated well operation, (3) computerized well-field operation (as of PG&E's Geysers Unit No. 15) and (4) further steamfield interconnection (cross-overs). Controls for liquid geothermal resources are largely in developmental or theoretical stages and greater efforts are needed to insure resource development with minimal environmental consequences. GRA

N80-33974# Midwest Research Inst., Kansas City, Mo.
SOURCE EMISSION MEASUREMENTS OF VOLATILE ORGANIC CHEMICALS Final Report, Sep. 1978 - Dec. 1979
George W. Scheil, Fred J. Bergman, and Harold Owens Jul. 1980 48 p refs
(Contract EPA-68-02-2977)
(PB80-198518; EPA-600/2-80-166) Avail: NTIS HC A03/MF A01 CSCL 14B

Analytical methods for measuring volatile organic compounds were reviewed. Two commercially available instruments were selected and evaluated in the laboratory; one was judged unacceptable. The other analyzer was evaluated during limited field test; results were satisfactory and averaged 3 percent higher than results produced by a concurrently operated gas chromatograph system. GRA

N80-33975# Office of Naval Research, Tokyo (Japan). Scientific Liaison Office.
ELECTROSTATIC PRECIPITATION RESEARCH IN JAPAN
Leon H. Fisher Apr. 1980 60 p refs Submitted for publication
(PB80-194137) Avail: NTIS HC A04/MF A01 CSCL 13B

Japanese research activities and trends involving the electrostatic removal of suspended particles, fumes, and mists from flowing gases are reviewed. A general discussion of electrostatic precipitation principals and an historical overview of their application to pollution control is included. The background to Japanese interest in electrostatic precipitation technology is reviewed, and matrix under which research in this area is carried out in Japan is described. The activities of the Institute of Electrostatics and of the Electrostatics Laboratory at the University of Tokyo are reviewed. Listings of the names and addresses of Japanese manufacturers of electrostatic precipitation equipment and of Japanese researchers in this field are included. GRA

N80-33976# Washington Univ., Seattle. Dept. of Civil Engineering.
MONITORING BY AERIAL AND TERRESTRIAL PHOTOGRAMMETRY Final Report
S. A. Veress, J. N. Hatzopoulos, and Riad Munjy Dec. 1979 115 p refs Sponsored in part by Washington State Dept. of

Transportation, Olympia, Wash. and FHA, Olympia, Wash.
(PB80-192925; FHWA-WA-80-38.1) Avail: NTIS HC A06/MF A01 CSCL 13B

A photogrammetric monitoring method of structural deformation was developed. The method is based on a combination of aerial and terrestrial photographs. The theoretical experimentation for formulation of computer programs was done on mathematical models. The combination of aerial and terrestrial photographs provides a 30% increased accuracy if compared to terrestrial photographs only. Practical experimentation was done on the existing Gabion Wall and it was indicated that the achievable accuracy is 1/120,000 of the photographic distance. The method is flexible if it can be used for monitoring of any type of structure as well as for aerial triangulation. GRA

N80-33977 SRI International Corp., Menlo Park, Calif.
SODAR NETWORK SUPPORT FOR LIRAQ UTILIZATION IN CONJUNCTION WITH PROJECT MABLE Final Report, Jun. 1978 - Oct. 1979
Phillip B. Russell Oct. 1979 44 p refs
(Contract ARB-A7-184-309)
(PB80-192909; SRI-8052; ARB-R-79/118) Avail: NTIS HC A03/MF A01 CSCL 13B

A network of six sodars (acoustic radars) was operated in the San Francisco Bay area from late July to early September 1978. The purpose of the network was to acquire inland mixing-depth data for use by the Bay Area Air Quality Management District in their studies of summer oxidant episodes in conjunction with data from Project MABLE. The sodar data from 28 July through 15 August were reduced to a digital form giving hourly mixing-depth estimates and surface-stability indicators. A computer code was developed to plot these data, thus giving an overview and facilitating comparisons among different sites, days, and times of day. Listings and plots of the digital data are shown and discussed. The importance of site selection and equipment maintenance to resulting sodar data quality is emphasized through examples. GRA

N80-33978 South Carolina Univ., Columbia. Dept. of Chemistry.
EVALUATION OF SOLID ADSORBENTS FOR COLLECTING ATMOSPHERIC CHLORINATED HYDROCARBONS
Terry F. Bidleman, W. Neil Billings, and Charles G. Simon Jul. 1980 67 p refs
(Grant EPA-R-804716)
(PB80-198526; EPA-600/2-80-167) Avail: NTIS HC A04/MF A01 CSCL 13B

The comparative efficiency of polyurethane foam (PUF) and Tenax-GC resin for collecting polychlorinated biphenyls (PCB) and chlorinated pesticides from 300-1600 cu m air was determined by side-by-side sampling with each adsorbent in the city of Columbia, South Carolina. GRA

N80-33979*# National Oceanic and Atmospheric Administration, Washington, D. C. Environmental Data and Information Service.
PROCEEDINGS OF THE WORKSHOP ON GOVERNMENT OIL SPILL MODELING
Joseph M. Bishop, comp. Feb. 1980 32 p Workshop held at Wallops Island, Va., 7-9 Nov. 1979
(NASA-CR-163640; PB80-190945; NOAA-80042401) Avail: NTIS HC A03/MF A01 CSCL 13B

Oil spill model users and modelers were brought together for the purpose of fostering joint communication and increasing understanding of mutual problems. The workshop concentrated on defining user needs, presentations on ongoing modeling programs, and discussions of supporting research for these modeling efforts. Specific user recommendations include the development of an oil spill model user library which identifies and describes available models. The development of models for the long-term fate and effect of spilled oil was examined. GRA

N80-33980# Radian Corp., Austin, Tex.
STACK GAS REHEAT EVALUATION Final Report, Jun. 1977 - Feb. 1980
W. R. Menzies, C. A. Muela, and G. P. Behrens Mar. 1980 315 p refs
(Contract EPA-68-02-2642)
(PB80-196850; EPA-600/7-80-051) Avail: NTIS HC A14/MF A01 CSCL 13B

Results of technical and economic evaluations of stack gas reheat (SGR) following wet flue gas desulfurization (FGD) for coal fired power plants are given. The evaluations were based on information from literature and a survey of FGD users, vendors, and architect/engineer firms. SGR processes and their features and their commercial operating experience are summarized. It addresses benefits and energy requirements associated with SGR, and describes a developed method for estimating reheat costs. SGR can protect equipment downstream of a wet scrubber from corrosion, reduce the potential for acid rainout near the plant stack, preclude visible stack plumes, and reduce ground level pollutant concentrations by increasing plume buoyancy. GRA

N80-33981# Midwest Research Inst., Kansas City, Mo. Environmental Systems Dept.
FINE PARTICLE EMISSIONS INFORMATION SYSTEM Annual Report, Jan. - Dec. 1979
J. P. Reider and R. F. Hegarty May 1980 67 p refs
(Contract EPA-68-02-2641; MRI Proj. 4396-L)
(PB80-195753; EPA-600/7-80-092) Avail: NTIS HC A04/MF A01 CSCL 05B

The Fine Particle Emissions Information System (FFES) is a computerized inventory of the particle measurement information for researchers engaged in fine particle control technology development and in the environmental assessment of energy and industrial processes. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N80-33982 California Univ., Los Angeles.
TWO DIMENSIONAL SMOOTHING OF A VECTOR LAPLACIAN RANDOM FIELD WITH APPLICATION TO GEODESY Ph.D. Thesis
Samiresh Chandra Bose 1980 180 p
Avail: Univ. Microfilms Order No. 8023279

A two dimensional signal processing algorithm was developed to obtain smoothed estimates of a vector random field when observed in the presence of additive two dimensional white noise. The vector random field consists of a two dimensional scalar random field and its two orthogonal derivatives, each of which can be scaled arbitrarily by a constant. The signal model consists of the Laplacian operator acting on the two dimensional scalar random field excited by two dimensional white noise. The algorithm can be used to process noisy gravity measurements on a local region on the surface of the Earth. Using the physical theory of geodesy, it is shown that in the formulation of the smoothing algorithm the two dimensional scalar random field represents the anomalous gravitational potential on a local region on the surface of the Earth and vector random field consists of the gravity anomaly and two deflections of the vertical.
Dissert. Abstr.

N80-33983 Colorado Univ. at Boulder.
SEISMIC STRESS RELAXATION PHENOMENA IN AN INHOMOGENEOUSLY PRESTRESSED MEDIUM Ph.D. Thesis
Jeffry Lowell Stevens 1980 288 p
Avail: Univ. Microfilms Order No. 8021640

Seismic sources in a very general prestress field were studied. The effects of inhomogeneous prestress fields on seismic radiation were investigated. The investigation was made through the use of spherical source models. An exact solution was found for the sudden creation of a spherical cavity in an arbitrarily prestressed medium. This was applied first to homogeneous stress fields, next to general inhomogeneous stress fields, and finally to the case in which stress concentrations were located nearby.
Dissert. Abstr.

N80-33986 Texas A&M Univ., College Station.
ORIGIN AND OCCURRENCE OF SELECTED WORLD WIDE CALCRETE DEPOSITS Ph.D. Thesis
Robert Eugene Tompkins 1980 156 p
Avail: Univ. Microfilms Order No. 8023077

Seven calcrete deposits from a variety of climatic environments and substrate conditions were sampled to determine the sequence and modes of formation, in addition to diagenetic alterations following deposition. Emphasis was placed on the mineralogy, crystal morphology, and elemental composition of individual sections of each calcrete deposit. These parameters promoted characterization of climatic affects from several geographic locations and a detailed mode of formation for each deposit. Two basic modes of formation are responsible for the synthesis of these calcrete profiles: (1) addition of new carbonate material resulting in calcrete formed by upward accretion; and (2) sparmicritization, which refers to degrading recrystallization of sparry calcite to micrite by dissolution of the spar and concomittant precipitation of micrite in the space previously occupied by spar. Dissert. Abstr.

N80-33985 California Univ., Los Angeles.
A NUMERICAL STUDY OF THE EFFICIENCY WITH WHICH AEROSOL PARTICLES COLLIDE WITH SIMPLE PLANAR ICE CRYSTALS Ph.D. Thesis
Jon Joseph Martin 1980 514 p
Avail: Univ. Microfilms Order No. 8023343

A theoretical investigation is presented on the interaction of simple planar ice crystals with aerosol particles in air of various conditions. A fuller elucidation of the importance of plate-like ice crystals in the overall atmospheric aerosol particle budget is provided. Two theoretical models, the trajectory model and the flux model, are discussed which permit the computation of the efficiency with which aerosol particles are collected by simple ice crystal plates idealized by thin oblate spheroids. The calculations considered various atmospheric pressures, temperatures and relative humidities. Particle capture due to inertial impaction, Brownian diffusion, thermophoresis, diffusiophoresis and electrostatic forces are considered. It is shown that, analogous to water drops, ice crystals exhibit a minimum in collision efficiency within a specific size interval of aerosol particles. The minimum is strongly affected by the relative humidity of the ambient air. Our theoretical results are found to agree satisfactorily with the laboratory studies presently available. Dissert. Abstr.

N80-33986 California Univ., Los Angeles.
DYNAMIC TRANSPORT OF INERT TRACERS BY GROWING BAROCLINIC AND STATIONARY PLANETARY WAVES IN THE LOWER STRATOSPHERE OF THE NORTHERN HEMISPHERE IN WINTER Ph.D. Thesis
John Gerald DeVore 1980 175 p
Avail: Univ. Microfilms Order No. 8023295

The roles of growing baroclinic and stationary planetary waves in effecting transports of inert tracers such as ozone in the lower stratosphere of the Northern Hemisphere in winter are studied theoretically. Wave velocity fields are derived from linear, quasi-geostrophic theoretical models: in the case of growing baroclinic waves, a beta-plane channel model; and, in the case of stationary planetary waves, a hemispheric model. The associated wave-induced mean meridional circulations are calculated with complementary models. The three-to-one relative importance of horizontal to vertical velocities in producing the relationship of ozone vertical column content to cyclonic depressions is confirmed for the prototype baroclinic wave. The observed longitudinal asymmetries in seasonal averages of total ozone are well reproduced by the model stationary planetary waves. It is shown that stationary planetary waves are significant contributors to the winter-time buildup of ozone in the high latitudes of the Northern Hemisphere. Dissert. Abstr.

N80-33987 North Carolina State Univ. at Raleigh.
AN INVESTIGATION OF CERTAIN FUNDAMENTAL INVARIANCE PROPERTIES OF FIELD THEORIES INCLUDING GRAVITATIONAL THEORIES WITH TORSION Ph.D. Thesis
William Mebane Baker 1980 166 p
Avail: Univ. Microfilms Order No. 8020518

The scale invariant Lagrangian densities in Riemannian and nonRiemannian spacetimes are examined. The most general scale invariant Lagrangian density of a Riemann-Cartan spacetime can also be reduced in a manner similar to that demonstrated earlier by Lanczos for the Riemannian case. However, this type of reduction process is not possible in a nonmetric spacetime. Duality transformations of the type defined in electromagnetic theory are discussed and classified in terms of those transformations having a direct relationship to an internal symmetry structure of a given gauge theory and those that do not. It is shown that to build a satisfactory generalized electromagnetic type theory with local duality invariance into a gauge theory, as at least a part of its internal symmetry structure requires a group no smaller than SO3 or (SU2). Various reductions in an SO3 invariant model with sources are considered which allow one to see how the standard form of Maxwell's theory, together with some of its immediate generalizations may be thought of as embedded in the nonAbelian gauge theory. These reductions and this type of embedding of a Maxwell type theory are discussed in connection with spontaneous symmetry breaking. A simple type of doubled Weinberg-Salam model that could include a duality invariant form of electromagnetic theory with magnetic monopoles is briefly considered. Dissert. Abstr.

N80-33988 Texas Univ. at Austin.
A MULTI-SITE MAGNETOTELLURIC MEASUREMENT SYSTEM WITH REAL TIME DATA ANALYSIS Ph.D. Thesis
James David Becker 1980 191 p
Avail: Univ. Microfilms Order No. 8021400

A magnetotelluric measurement system was designed to provide a more cost effective electrical method for geothermal and mineral exploration. The theoretical requirements and sensitivities of the magnetotelluric inversion process were specifically addressed in determining system performance requirements. Significantly reduced instrument noise levels provided improved data quality, and simultaneous measurement at up to six locations provided reduced cost per site. Dissert. Abstr.

N80-33989 Pennsylvania State Univ., University Park.
THE DETECTION OF ATMOSPHERIC GRAVITY WAVES BY MEANS OF THE WAVE INTERACTION EXPERIMENT Ph.D. Thesis
Michael Peter Sulzer 1979 223 p
Avail: Univ. Microfilms Order No. 7922353

Gravity wave propagation theory is reviewed, and expressions are derived which allow the development of sensitivity relations for the wave interaction experiment to the propagation of gravity waves. The effect of the variation of various ionospheric parameters upon the wave interaction coefficient is investigated and the effect of a gravity wave is deduced. Horizontal and vertical spatial sensitivities are found and other factors affecting the detection of gravity waves are discussed. The technique and equipment of the wave interaction were modified to allow continuous recording and simultaneous measurement at many heights. Data collected at the National Astronomy and Ionosphere Center and at the Scotia field station of the Ionosphere Research Laboratory were analyzed using carefully described statistical techniques. Results consistent with the propagation of mesospheric gravity waves are presented and discussed. Dissert. Abstr.

N80-33990 Cornell Univ., Ithaca, N. Y.
RADAR OBSERVATIONS OF THE EQUATORIAL ELECTROJET IRREGULARITIES AND THEORY OF TYPE 1 TURBULENCE Ph.D. Thesis
Henrick Mario Ierkic Vidmar 1980 174 p
Avail: Univ. Microfilms Order No. 8020836

The dependence of the cross section of the equatorial electrojet irregularities with zenith angle (magnetic east to west) was measured. It was found that for the type 1 irregularities the cross section has an exponential dependence with zenith angle increasing at a rate of about 0.3 db/degree. The type 2 irregularities have a constant cross section. The absolute values of the cross section were also measured and the total density fluctuation levels for both types of irregularities estimated. The nighttime electrojet was examined using an interferometric technique. The vertical profiles of the electron velocity were

measured and irregularities with small Doppler shifts were observed to be diffuse while the type 1 waves are localized in space. The direct interaction approximation method of Kraichnan was applied to explain the possibility of nonlinear shifts from the linearly predicted modes for the type 1 waves. The method provided two coupled integral equations relating the intensity of density fluctuations and the nonlinear frequency shift and damping of the unstable waves. Dissert. Abstr.

N80-33991*# Ohio State Univ., Columbus. Dept. of Geodetic Science.

GEODETIC POSITIONING USING A GLOBAL POSITIONING SYSTEM OF SATELLITES

Patrick J. Fell Jun. 1980 297 p refs Prepared for Defense Mapping Agency, Washington, D.C.

(Grant NsG-5265; OSURF Proj. 711055)

(NASA-CR-163609; OSU-299) Avail: NTIS HC A13/MF A01 CSCL 08E

Geodetic positioning using range, integrated Doppler, and interferometric observations from a constellation of twenty-four Global Positioning System satellites is analyzed. A summary of the proposals for geodetic positioning and baseline determination is given which includes a description of measurement techniques and comments on rank deficiency and error sources. An analysis of variance comparison of range, Doppler, and interferometric time delay to determine their relative geometric strength for baseline determination is included. An analytic examination to the effect of a priori constraints on positioning using simultaneous observations from two stations is presented. Dynamic point positioning and baseline determination using range and Doppler is examined in detail. Models for the error sources influencing dynamic positioning are developed. Included is a discussion of atomic clock stability, and range and Doppler observation error statistics based on random correlated atomic clock error are derived. Author

N80-33992*# Miami Univ., Fla. Div. of Meteorology and Physical Oceanography.

NUMERICAL STUDY OF BAROCLINIC INSTABILITY Final Report, 1 Sep. - 30 Nov. 1979

J. E. Geisler and W. W. Fowlis 6 Mar. 1980 17 p refs

(Contract NAS8-33558)

(NASA-CR-161580) Avail: NTIS HC A02/MF A01 CSCL 04A

The effect of a power law gravity field on baroclinic instability is examined with emphasis on the case of inverse fifth power gravity, since this is the power law produced when terrestrial gravity is simulated in spherical geometry by electrostatic means. Growth rates of unstable normal modes were obtained as a function of parameters of the problem by solving a second order differential equation numerically. Results are compared with those from an earlier study where gravity was a constant. The conclusion is that, over the range of parameter space explored here, there is no significant change in the character of theoretical regime diagrams if the vertically averaged gravity is used as a parameter. A.R.H.

N80-33993*# California Inst. of Tech., Pasadena.

FUNDAMENTALS STUDIES IN GEODYNAMICS Final Technical Report, 1 Aug. 1979 - 31 Jul. 1980

Don L. Anderson Jul. 1980 300 p refs

(Grant NsG-7610)

(NASA-CR-163620) Avail: NTIS HC A13/MF A01 CSCL 08G

Research in geodynamics, seismology, and planetary quakes is presented. Terradynamics and plate tectonics are described using dynamic models. The early evolution of the Earth's mantle is also discussed. T.M.

N80-33994# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). National Council for Scientific and Technical Research.

COMMENT ON AIRGLOW OBSERVATIONS OF THE OI 7774 A MULTIPLET AT ARECIBO DURING A MAGNETIC STORM BY ROGER G. BURNSIDE, JOHN W. MERIWETHER AND JAMES C. G. WALKER

Y. Sahai, J. A. Bittencourt, and N. R. Teixeira Aug. 1980 13 p refs

(INPE-1843-RPE/203) Avail: NTIS HC A02/MF A01

Measurements and theoretical calculations of the 7774A and 6300A emissions for Arecibo, Puerto Rico, for May 2-3, 1976 during severe magnetic storm conditions are presented. The 6300 A observations were made with a tilting filter photometer looking at zenith, whereas the 7774A observations were made with a 1.0 m Ebert-Fastie spectrometer looking towards the west at an elevation angle of 20 deg. The theoretical calculations of the vertical column intensities of these emissions for this specific night, were performed using vertical electron density profile measurements made with the Arecibo 430 MHz radar. Their results show a reasonably good fit between experimental and theoretical 6300 A emissions. However, for the 7774A emission, there is a discrepancy between the theoretical vertical column intensities and the intensities observed looking west at 70 deg. from the zenith. Possible excitation mechanisms to explain the excess 7774A observed intensities are discussed. R.K.G.

N80-33995# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

ABSORPTION EQUILIBRIUM OF SOLAR RADIATION BETWEEN THE TWO HEMISPHERES OF EARTH [EQUILIBRIO DA ABSORCAO DA RADIACAO SOLAR ENTRE OS DOIS HEMISFERIOS DA TERRA]

Daniel Jean Roger Nordemann Aug. 1980 20 p refs In PORTUGUESE; ENGLISH summary

(INPE-1851-RPE/208) Avail: NTIS HC A02/MF A01

The absorption of solar radiation by the Earth is a function of astronomical parameters (height, distance from the Sun) and of terrestrial parameters (albedo, bio-albedo, latent heat). The distribution of ocean and land may induce a disequilibrium of the solar radiation absorption between both hemispheres. The energy intake calculated by latitude zone, taking into account the global cloud cover, shows the balance between both hemispheres due to climate feedback processes. S.F.

N80-33996*# Illinois Univ., Urbana. Dept. of Electrical Engineering.

RESEARCH IN AERONOMY Progress Report, 1 Oct. 1979 - 31 Mar. 1980

Belva Edwards, ed. 31 Mar. 1980 101 p refs

(Grants NGR-14-005-181; NsG-5213; NsG-7506; NSF ATM-79-09982; NSF ATM-78-05224; NSF ATM-78-21765; NSF ATM-78-12308; NSF ATM-76-01773)

(NASA-CR-163610; PR-80-1) Avail: NTIS HC A06/MF A01 CSCL 04A

Rocketborne instruments used in aeronomy are described. Planetary wave dynamics are discussed. Coherent and incoherent scatter radar observations are presented. Laser radar and its calibration are discussed. T.M.

N80-33997*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

COORDINATED IONOSPHERIC AND MAGNETOSPHERIC OBSERVATIONS FROM THE ISIS 2 SATELLITE BY THE ISIS 2 EXPERIMENTERS. VOLUME 1: OPTICAL AURORAL IMAGES AND RELATED DIRECT MEASUREMENTS

J. S. Murphree Jul. 1980 208 p

(NASA-TM-81121; NSSDC/WDC-A-R/S-80-03-Vol-1) Avail: NTIS HC A10/MF A01 CSCL 04A

A representative set of data from ISIS 2 covering a range of operating modes and geophysical conditions is presented. The data show the typical values and range of ionospheric and magnetospheric characteristics, as viewed from 1400 km with the ISIS 2 instruments. The definition of each data set depends partly on geophysical parameters and partly on satellite operating mode. Preceding the data set is a description of the organizational parameters and a review of the objectives and general characteristics of the data set. The data are shown as a selection from 12 different data formats. Each data has a different selection of formats, but uniformity of a given format selection is preserved throughout each data set. T.M.

N80-33998*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ATMOSPHERIC SOLAR ABSORPTION MEASUREMENTS IN THE 9 TO 11 MU M REGION USING A DIODE LASER HETERODYNE SPECTROMETER

Charles N. Harward and James M. Hoell, Jr. Oct. 1980 14 p refs Presented at Heterodyne Systems and Technol. Conf., Williamsburg, Va., 25-27 Mar. 1980
(NASA-TP-1726; L-13877) Avail: NTIS HC A02/MF A01 CSCL 04A

A tunable diode laser heterodyne radiometer was developed for ground-based measurements of atmospheric solar absorption spectra in the 8 to 12 microns spectral range. The performance and operating characteristics of this Tunable Infrared Heterodyne Radiometer (TIHR) are discussed along with atmospheric solar absorption spectra of HNO3, O3, CO2, and H2O in the 9 to 11 microns spectral region. T.M.

N80-33999*# National Aeronautics and Space Administration, Washington, D. C.
THE COORDINATED FEDERAL PROGRAM FOR THE APPLICATION OF SPACE TECHNOLOGY TO CRUSTAL DYNAMICS AND EARTHQUAKE RESEARCH
Pitt G. Thome Jan. 1979 17 p refs Prepared in cooperation with NOAA and Geological Survey and NSF and Defense Mapping Agency
(NASA-TM-82215) Avail: NTIS HC A02/MF A01 CSCL 08G

The application of space technology to important problems relating to crustal dynamics and earthquake research is described. Federal plans for such applications are summarized.T.M.

N80-34000*# National Aeronautic Association, Washington, D. C.
NASA PLAN FOR INTERNATIONAL CRUSTAL DYNAMICS STUDIES
Apr. 1979 34 p refs
(NASA-TM-82214) Avail: NTIS HC A03/MF A01 CSCL 08G

The international activities being planned as part of the NASA geodynamics program are described. Methods of studying the Earth's crustal movements and deformation characteristics are discussed. The significance of the eventual formalations of earthquake predictions methods is also discussed. R.C.T.

N80-34001# Birmingham Univ. (England). Dept. of Space Research.
ION-ION NEUTRALIZATION Interim Report, 1 Apr. 1978 - 30 Sep. 1979
David Smith and Nigel G. Adams Nov. 1979 16 p refs
(Grant AF-AFOSR-3260-77)
(AD-A080209; AFGL-TR-80-0010; IR-2) Avail: NTIS HC A02/MF A01 CSCL 04/1

This work is part of a larger program of ionic reaction studies at thermal energies, conducted by the authors of this report, which includes determinations of ion-molecule reaction rate coefficients and product ion distributions, electron-ion recombination coefficients and electron attachment coefficients. The work is largely intended as a contribution of the physics and chemistry of natural plasmas such as the Earth's atmosphere and the interstellar medium. A great deal of relevant data has been obtained principally because of our successful development and exploitation of the Langmuir probe/flowing afterglow and selected ion flow tube (SIFT) techniques. GRA

N80-34002# Air Force Geophysics Lab., Hanscom AFB, Mass. Aeronomy Div.
INSTRUMENTATION DEVELOPMENT FOR LASSII EQUATORIAL MEASUREMENTS Final Report, Oct. 1977 - Mar. 1980
Edmund Trzcinski 23 Apr. 1980 18 p
(AF Proj. 2310)
(AD-A088880; AFGL-TR-80-0150; AFGL-IP-287) Avail: NTIS HC A02/MF A01 CSCL 04/1

A quadrupole ion mass spectrometer capable of measuring ion composition during equatorial ionospheric irregularities with a spatial resolution of 4 m over a range of 1 to 56 AMU is discussed. Instrument sensitivity has been adjusted to cover an ion concentration range of 10 ions/cc to million ions/cc. A separate measurement of ion density and its fluctuations is also made. The instrument was developed to fly on a space-shuttle-launched LASSII satellite. GRA

N80-34003# Air Force Geophysics Lab., Hanscom AFB, Mass.
ALMOST-NECESSARY CONDITIONS FOR A SOLAR ACTIVE REGION TO PRODUCE A SUBSEQUENT POLAR CAP ABSORPTION EVENT Air Force surveys in geophysics
Edward W. Cliver 17 Apr. 1980 20 p refs
(AF Proj. 4643)
(AD-A088882; AFGL-TR-80-0151; AFGL-AFSG-425) Avail: NTIS HC A02/MF A01 CSCL 14/1

Between 1955 and 1976, 133 polar cap absorption (PCA) events with unambigious solar flare associations were observed. Over one-fourth of these events (35/133) originated in solar active regions that had already produced a PCA. More significantly, these 'subsequent' PCA's included 35 percent (26/74) of all the principal greater than or equal to 2.0 dB) PCA's in this sample. In this paper, we establish quantitative criteria to distinguish between those solar active regions that are likely to produce such subsequent absorption events and those that pose no further threat to high latitude HF or VLF communications. These criteria are based on flare solar disk position and the greater than or equal to 8800 MHz burst peak flux density. GRA

N80-34004# SRI International Corp., Menlo Park, Calif.
ATMOSPHERIC/IONOSPHERIC/MAGNETOSPHERIC ARCH USING THE CHATANIKA RADAR Final Report, 1 Nov. 1976 - 31 Oct. 1979
M. J. Baron 31 Jan. 1980 48 p refs
(Contract DNA001-77-C-0042)
(AD-A088915; AD-E300897; DNA-5239F) Avail: NTIS HC A03/MF A01 CSCL 04/1

The Chatanika incoherent scatter radar (located near Fairbanks, Alaska) has been operated by SRI International for the Defense Nuclear Agency and has been used to investigate atmospheric/ionospheric/magnetospheric phenomena of interest to the DNA. This report summarizes the accomplishments of the past three years. GRA

N80-34005# Regis Coll., Weston, Mass.
IN-FLIGHT CHARACTERISTICS OF THE TOPSIDE IONOSPHERIC MONITOR (SSIE) ON THE DMSP SATELLITE FLIGHT 2 AND FLIGHT 4 Environmental Research papers. Interim Status Report
F. Rich, M. Smiddy, R. C. Sagalyn, W. J. Durke, and P. Anderson 17 Apr. 1980 29 p refs Prepared in cooperation with AFGL, Hanscom AFB, Mass.
(Contract F19628-77-C-0122; AF Proj. 2371)
(AD-A088879; AFGL-TR-80-0152; AFGL-ERP-700) Avail: NTIS HC A03/MF A01 CSCL 04/1

The Topside Ionospheric Plasma Monitor (SSIE) has been successfully flown on the Block 5D DMSP satellites on Flight 2 and Flight 4. This report describes the value and the limitations of these data based on an analysis of in-flight data. The SSIE is useful for determining the relative variation of the plasma density along the orbit of the satellite on a nearly continuous basis from August 1977 to February 1980. Variations in plasma density due to daily and seasonal changes in the ionosphere can be determined. Variations due to geomagnetic storms and substorms can also be determined. The instrument is limited during daytime operations by a large negative potential caused by the solar panels. During daylight operations, thermal ions are accelerated toward the ion sensor and thermal electrons are deflected away. On F4, a series of four floating bias potentials between the instruments and the spacecraft ground was installed and has proven successful. These bias potentials will be used for SSIE instruments on Flights 5 through 7. Additional design changes for Flights 8 through 10 are discussed. A format for archived data types for Flights 5 through 7 is described. GRA

N80-34006# Federal Aviation Agency, Washington, D.C. Office of Environment and Energy.
PROCEEDINGS OF THE NATO ADVANCED STUDY INSTITUTE ON ATMOSPHERIC OZONE AND ITS VARIATION AND HUMAN INFLUENCES
Marcel Nicolet and Arthur C. Aikin May 1980 976 p refs Conf. held in Aldeia das Acoteias, Portugal, 1-13 Oct. 1979
(AD-A088889; FAA-EE-80-20) Avail: NTIS HC A99/MF A01 CSCL 04/1

This volume contains the proceedings of a North Atlantic

Treaty Organization Advanced Study Institute on Atmospheric Ozone and its Human Influences. The conference was held at Aldeia das Acoteias, Portugal in October 1979. Included are papers for speakers who were invited to review the current state of knowledge for different aspects of the ozone problem. Selected short contributions of new results by other conference attendees are also given. Topics covered include solar flux and its changes, ozone observations and the theories of spatial and temporal distribution of ozone. Natural and man made trace gases which may influence atmospheric ozone are also discussed. GRA

N80-34007# Texas Univ. at El Paso.
THE DESIGN AND IMPLEMENTATION OF A COMPUTERIZED DATA REDUCTION SYSTEM
Ka-Bun John Ho and John D. Mitchell 31 Jan. 1980 136 p refs
(Contract DAAD07-78-C-0010)
(AD-A088734; SR3-80-UA-77) Avail: NTIS HC A07/MF A01 CSCL 04/1

A computerized system for reducing middle atmosphere electrical conductivity data obtained by blunt probes and Gerdien condensers is developed. In addition to improving the computational speed and accuracy, this particular system enhances the instrument's sensitivity range, i.e. the altitude region over which measurements can be obtained. The reduction system is designed strongly toward software portability and micro-processor adaptability. Electrical conductivity data from recently launched blunt probes were reduced using this system, and the results are discussed in this thesis. Future expansion, improvements and two proposed micro-processor system designs are also presented. GRA

N80-34008# Naval Research Lab., Washington, D. C. Ionospheric Diagnostics Section.
EQUATORIAL SPREAD F IN SITU MEASUREMENTS OF ELECTRON DENSITY TEMPERATURE AND DENSITY FLUCTUATION POWER SPECTRA Interim Report
E. P. Szuszczewicz and J. C. Holmes 25 Aug. 1980 36 p refs
(AD-A089133; NRL-MR-4289) Avail: NTIS HC A03/MF A01 CSCL 04/1

The NRL pulsed plasma probe experiment was successfully flown on each of the two PLUMEX rockets during July 1979. The experiment provided direct measurements of absolute density, temperature, and density fluctuation power spectra with a maximum Nyquist frequency of 1 KHz. In the first operation, a number of major depletions were distributed throughout the F-region, from its bottomside gradient centered near 260 km, through the F-peak, to a topside altitude of 500 km. The most intense in situ irregularities occurred on the bottomside ledge where gradient scale lengths were found to vary between 2 and 25 km. The results support the role of the collisional Rayleigh-Taylor instability in generating intermediate wavelength irregularities during the occurrence of equatorial spread-F. GRA

N80-34009*# National Bureau of Standards, Washington, D.C.
KINETIC AND PHOTOCHEMICAL DATA FOR ATMOSPHERIC CHEMISTRY REACTIONS OF THE NITROGEN OXIDES Final Report, Jan. - Dec. 1979
R. F. Hampson, Jr. May 1980 95 p refs Sponsored in part by NASA, Washington, D.C.
(PB80-198799; NBSIR-80-2032) Avail: NTIS HC A05/MF A01 CSCL 04A

Data sheets for thermal and photochemical reactions of importance in the atmospheric chemistry of the nitrogen oxides are presented. For each reaction the available experimental data are summarized and critically evaluated, and a preferred value of the rate coefficient is given. The selection of the preferred value is discussed and an estimate of its accuracy is given. For the photochemical process, the data are summarized, and preferred for the photoabsorption cross section and primary quantum yields are given. GRA

N80-34010# Woods Hole Oceanographic Institution, Mass. Dept. of Geology and Geophysics.
ASSESSMENT OF SEABED SEISMIC SYSTEMS
Elizabeth T. Bunce Apr. 1980 28 p refs Prepared in cooperation with Sandia Labs., Livermore, Calif.
(PB80-195985; WHOI-80-24) Avail: NTIS HC A03/MF A01 CSCL 08G

The necessary research and documentation of existing seismic techniques and systems for the study of sediments and sedimentary structures in the oceans are presented. GRA

N80-34011*# National Oceanic and Atmospheric Administration, Boulder, Colo. Space Environment Lab.
SOLAR-TERRESTRIAL PREDICTIONS PROCEEDINGS. VOLUME 4: PREDICTION OF TERRESTRIAL EFFECTS OF SOLAR ACTIVITY
Richard E. Donnelly, ed. Mar. 1980 660 p refs Proceedings held at Boulder, Colo., 23-27 Apr. 1979 Sponsored in part by NASA, AFGL, AFOSR, DOE, and NSF 4 Vol.
(PB80-200025; NOAA-80060202) Avail: NTIS HC A99/MF A01 CSCL 04A

Papers about prediction of ionospheric and radio propagation conditions based primarily on empirical or statistical relations is discussed. Predictions of sporadic E, spread F, and scintillations generally involve statistical or empirical predictions. The correlation between solar-activity and terrestrial seismic activity and the possible relation between solar activity and biological effects is discussed. GRA

N80-34012# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR TERRESTRIAL PHYSICS SERVICES AND PUBLICATIONS 1980
Apr. 1980 34 p refs
(PB80-199136; NOAA-80052907) Avail: NTIS HC A03/MF A01 CSCL 04A

The identifications of the Solar Terrestrial Physics (STP) data disciplines and subdisciplines and related products and services with instructions on how and where to obtain them are given. There are seven major categories of data pertinent to STP. Each contains several subdisciplines. An eighth category contains miscellaneous data which are of interest to STP scientists as well as to those working in other fields. GRA

N80-33812# National Center for Atmospheric Research, Boulder, Colo.
INFLUENCE OF OROGRAPHY ON THE ATMOSPHERIC GENERAL CIRCULATION
Akira Kasahara *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 1-49 Sponsored by NSF (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

N80-33813# National Center for Atmospheric Research, Boulder, Colo.
PLANETARY WAVES: THEORY AND OBSERVATION
Robert E. Dickinson *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 51-84 refs (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

N80-33819# Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
LABORATORY STUDIES OF TOPOGRAPHIC EFFECTS IN ROTATING AND/OR STRATIFIED FLUIDS
P. G. Baines and P. A. Davies (Newcastle-upon-Tyne Univ., England) *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 233-299 refs (For primary document see N80-33811 24-42)
(Grant NSF OCE-78-19833)
Avail: NTIS HC A12/MF A01

N80-33820# Oslo Univ. (Norway). Inst. of Mathematics.
OROGRAPHIC EFFECTS REVEALED BY SATELLITE PICTURES: MESOSCALE FLOW PHENOMENA
B. Gjevik *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 301-316 refs (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

N80-33821# Australian Numerical Meteorology Research Center, Melbourne.

OROGRAPHICALLY CONTROLLED CROSS-EQUATORIAL FLOW
David L. T. Anderson *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 317-355 refs (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N80-34013 British Library Lending Div., Boston Spa (England).
MEDIUM-SCALE STUDY OF A WAVING COLD FRONT
M. Gilet, Y. Thouvenin, and C. Lafaysse [1980] 44 p refs Transl. into ENGLISH from Meteorol. (Paris), 6th Ser., No. 15, 1978 p 69-90
(BLL-Trans-1453-(9022.549)) Avail: British Library Lending Div., Boston Spa, England

The radiosonde and radar wind data for one of the situations investigated by the 'Fronts-77' measurement project are presented. The cold front in question was preceded by a 'return south', and waved slightly, thus constituting a case relatively complicated in comparison with those normally discussed in the literature, and it showed that on the medium scale it could not be described except in a three dimensional fashion which takes account of time. A schematic representation of the evolution of the front is suggested. T.M.

N80-34014 British Library Lending Div., Boston Spa (England).
CIRCULATION SEASONS IN THE NORTHERN HEMISPHERE AND THE CHANGES IN THEIR DURATION IN THE TWENTIETH CENTURY
S. S. Savina [1980] 48 p refs Transl. into ENGLISH from Akad. Nauk, Inst. Geog., Climatogen. Res., (Moscow), 1974 p 44-67
(BLL-Trans-1455-(9022.549)) Avail: British Library Lending Div., Boston Spa, England

The genetic aspect of the development of seasonal phenomena and processes was investigated. The framework of the widely adopted four calendar seasons, which are of equal and recur regularly at given dates, are regarded as unsatisfactory. Rather, the solution to this problem was in terms of natural periods, namely the circulation seasons, in the course of which definite types of circulation develop and are maintained, and which are determined by the regularities of seasonal variation in large-scale atmospheric processes. On the basis of the seasonal characteristics of the development of circulation it was proposed to divide the year into five or six unequal periods. T.M.

N80-34015 Virginia Univ., Charlottesville.
A NUMERICAL SIMULATION OF THE INFLUENCE OF HEAT AND MOISTURE FLUXES UPON MESOSCALE CIRCULATIONS Ph.D. Thesis
Michael Charles McCumber 1980 277 p
Avail: Univ. Microfilms Order No. 8022955

A hydrostatic primitive equation model is used to evaluate the effects of variable soil conditions upon the development of a south Florida sea breeze. A multilayered soil profile is used to eliminate the numeric deficiencies often associated with slab soil parameterizations. Vegetation is also parameterized. Allowance is made for a variable number of canopies which can be mapped much like the soils. Three dimensional experiments indicated that the intensity and the pattern of the mesoscale convergence are strongly affected by soil conditions and their distribution. Vegetation also affects both the strength and pattern of the mesoscale convergence and it delays the strongest development by one to two hours where the soil is wettest. A general weakening and some broadening of the sea breeze convergence accompanied cloudiness and precipitation, which were predicted using a simple, explicit parameterization. These effects resulted from a reduced horizontal temperature gradient along the west coast of Florida. Dissert. Abstr.

N80-34016 Colorado State Univ., Fort Collins.
TROPICAL CYCLONE GENESIS: NUMERICAL MODELING INFERENCES Ph.D. Thesis
William A. Fingerhut 1980 163 p
Avail: Univ. Microfilms Order No. 8022398

Tropical cyclone genesis was investigated with an axisymmetric primitive equation model which is suitable for an investigation of tropical vortices. Cloud and cloud-free radiative heating, cumulus momentum rearrangement, momentum transport by horizontal eddies in the disturbance outflow layer and an improved formulation of surface evaporation are included in the model in addition to cumulus heating and other commonly used parameterizations. Initial conditions were derived from composite rawinsonde data sets which described both quasi-steady and developing cloud clusters. The initial disturbances also possessed a realistic radial circulation. The numerical model produced the correct disturbance evolution, growth or decay, from the observed nondeveloping and developing initial conditions. The growing disturbance was compared with observational data to show that the temperature and tangential wind fields, growth rate, as well as the mean radial circulation were realistic throughout the simulation. Dissert. Abstr.

N80-34017 State Univ. of New York at Albany.
A STUDY OF ICE NUCLEUS CONCENTRATIONS IN EASTERN NEW YORK STATE Ph.D. Thesis
John Zamurs 1980 189 p
Avail: Univ. Microfilms Order No. 8021978

A multi-phased investigation of ice nuclei is described. The goal was to gain an improved knowledge of the concentration of ice nuclei in the atmosphere and thereby a determination of representative ice nucleus (IN) concentrations in eastern New York State; and a better understanding of the static vapor diffusion chamber and the filter technique for the measurement of IN concentrations. The results of correlation and significance test IN concentrations with a number of meteorological parameter suggested the a link may have existed between IN concentrations and synoptic scale weather circulation. Based on significant correlations of IN concentrations with relative humidity, atmospheric pressure, cloud base height, upward vertical displacement, and depth of the mixing layer, a positive association appeared between high IN concentrations and cyclonic conditions. Dissert. Abstr.

N80-34018 Duke Univ., Durham, N. C.
MEASUREMENTS OF BOUNDARY LAYER FLOW OVER A FORESTED MOUNTAIN SLOPE Ph.D. Thesis
Fred Lear Mowry 1980 196 p
Avail: Univ. Microfilms Order No. 8021841

In order to measure turbulent transfer processes over a forested mountain slope, wind speed, air temperature, wet bulb depression temperature profiles, wind direction and radiation balance measurements were made. The instrumentation and measurements were evaluated. Based on the evaluation, the wind speed profiles and wind direction measurements were selected for further analysis. The measured wind profile slopes were linear and consistently less than the logarithmic profile law plotted through the highest wind level at all wind speeds, atmospheric stability conditions and wind directions. These deviations from the logarithmic profile law imply that the surface boundary layer equations for flow over horizontal terrain must be modified for flow over slopes. This conclusion was supported by the evidence from the wind profile analysis. Dissert. Abstr.

N80-34019 Nevada Univ., Reno.
A STUDY OF THE MICROSTRUCTURE OF CONVECTIVE CLOUDS: OBSERVATION AND THEORY Ph.D. Thesis
Quan-Ping Chang 1980 167 p
Avail: Univ. Microfilms Order No. 8021134

A detailed analysis of data from aircraft penetrations in convective clouds in Florida and northeast Colorado and a numerical study of drop growth by condensation were utilized to assess the relative importance of lateral and top mixing of environmental air during cloud evolution. The results were applied to the role of the evolution of the cloud droplet spectrum in controlling secondary ice crystal production during graupel growth at subfreezing temperatures. A new numerical method was developed to compute droplet condensation growth at the initial

stage. The discrepancy between the theoretical computations and observations confirmed the importance of air entrainment from the environment. Observations showed that the top mixing process is important in clouds which have a uniform distribution of drop concentration and liquid water content. Dissert. Abstr.

N80-34020 Texas A&M Univ., College Station.
CHANGES IN THE POTENTIAL FOR WIND ENERGY GENERATION DUE TO TERRAIN MODIFICATION OF THE BOUNDARY-LAYER FLOW Ph.D. Thesis
James Elwood Arnold, Jr. 1980 158 p
Avail: Univ. Microfilms Order No. 8023013

In situ measurements and a wind tunnel experiment were used to define the degree of wind speedup in the boundary-layer flow over the top of a small mesa. Measurements of the speedup of the wind relative to that observed over level terrain at the same height above the ground are presented as a function of distance from the windward edge of an escarpment. These results are shown for neutral as well as stable atmospheric conditions. It was found that the wind tunnel measurements, in situ measurements, and existing two dimensional models of the terrain modification of scarpment flow agreed well for neutral conditions but differed considerably when stable conditions existed at the mesa site. Dissert. Abstr.

N80-34021 Wyoming Univ., Laramie.
STATISTICAL CLASSIFICATION OF ICE PARTICLES AND RAINDROPS BY PATTERN RECOGNITION TECHNIQUES Ph.D. Thesis
Md. Mizanur Rahman 1980 207 p
Avail: Univ. Microfilms Order No. 8021846

The statistical classification of binary images of ice particles and raindrops taken from cloud samples is described. These images were recorded by an airborne two dimensional probe in order to provide information leading to an understanding of the important physical process in clouds. Detailed explanation of the data acquisition system and image preprocessing is given. The classification algorithm was modified to classify incomplete or fractional images and two metrics were successfully developed to detect the unclassifiable images. The adaptive Kalman filter with the Bayes decision function was employed to classify about two thousand images per minute of CPU time with about ten percent error. The error is mainly contributed by the fractional images present. No effort was made to reduce computing time by giving it special consideration from either the hardware or software point of view. Dissert. Abstr.

N80-34022*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CLIMATOLOGICAL RELATIONSHIPS OF SEVERE DUST-STORMS IN THE GREAT PLAINS TO SYNOPTIC WEATHER PATTERNS: A POTENTIAL FOR PREDICTABILITY
Peter M. Woiceshyn and John F. Henz 1 Oct. 1980 36 p refs
(Contract NAS7-100)
(NASA-CR-163626; JPL-PUB-79-97) Avail: NTIS HC A03/MF A01 CSCL 04B

A data base provided by 35 severe duststorms that occurred between 1968 and 1977 in the central and southern Great Plains allowed construction of a classification scheme of meteorological causes of duststorms, and a telescopic forecast technique for medium range (6 to 48 hour) prediction of severe cyclogenic duststorms. In addition, areal coverage definitions for duststorms based on characteristics of the storms, and a hierarchy of weather causes of severe duststorms were developed. The man machine mix forecast correctly predicted six of seven duststorms observed during the 1976-77 winter, with one overforecast; the machine-only forecast correctly predicted four of the seven duststorms, with one overforecast. Both techniques had problems correctly predicting the duration of severe duststorms. Author

N80-34023*# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
ATMOSPHERIC VARIABILITY AND AIR-SEA INTERACTION Final Report, 1 Apr. 1979 - 31 Jul. 1980
John W. Middleton and Elmar R. Reiter 31 Jul. 1980 22 p refs
(Grant NoG-5340)
Avail: NTIS HC A02/MF A01 CSCL 04B

The topics studied include: (1) processing of Northern Hemispheric precipitation data, in order to fill in the transition seasons to provide a continuous 40 year data base on the variability of continental precipitation; (2) comparison of seasonally averaged fields of sea surface temperature obtained from ship observations in the North Atlantic and North Pacific in 1970 with the corresponding fields inferred from satellite observations; (3) estimation of seasonal average of total precipitable water at those admittedly few oceanic stations where repeated vertical soundings were made in 1970 and comparison with corresponding values inferred from satellite measurements; (4) comparison of seasonally averaged evaporation fields determined from ground based observations in 1970 with the field of divergence of the seasonal total horizontal water vapor flux inferred from satellite total water measurements and NMC wind data for the lower troposphere; (5) examination of meaning of convection-inversion index. R.K.G.

N80-34024# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). National Council for Scientific and Technical Research.
STATISTICAL RELATION BETWEEN THE SOLAR CYCLE AND DROUGHT IN NORTHEAST BRAZIL [RELACAO ESTATISTICA ENTRE AS SECAS DO NORDESTE E O CICLO SOLAR]
I. J. Kantor Aug. 1980 15 p refs In PORTUGUESE; ENGLISH summary
(INPE-1839-RPE/200) Avail: NTIS HC A02/MF A01

The relationship between sunspot activity and drought in northeastern Brazil is discussed via harmonic and statistical analysis. The severest droughts occur in years of minimal sunspot activity. Transl. by S.F.

N80-34025# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Dept. of Space Systems.
DEVELOPMENT OF AN AUTOMATIC SYSTEM FOR PLOTTING SYNOPTIC CHARTS [DESENVOLVIMENTO DO SISTEMA DE AUTOMACAO DA PLOTAGEM DE CARTAS SINOTICAS]
Marcial Fernando Pio Sepulveda and Jose Antonio Goncalves Pereira Jun. 1980 12 p refs In PORTUGUESE
(INPE-1786-RPE/158) Avail: NTIS HC A02/MF A01

A computerized system for acquisition and presentation of weather data is discussed. Weather and navigation charts (sea and air) based on the resultant data are plotted with greater speed and accuracy. Transl. by S.F.

N80-34026# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ALGORITHM FOR EXTRACTING DATA FROM METEOROLOGICAL SATELLITES FOR USE IN ESTIMATING PRECIPITATION [ESTIMATIVA DE PRECIPITACAO IMAGENS SMS INFRAVERMELHO IPH/INPE REGIAO R. G. DO SUL EXTRACAO DE DADOS SMS]
Francisco E. Viola and Cecilia C. Camargo Jun. 1980 46 p refs In PORTUGUESE; ENGLISH summary Revised
(INPE-1769-RPE/155) Avail: NTIS HC A03/MF A01

Models for estimating precipitation from infrared images acquired by meteorological geostationary satellites were constructed. The algorithms implemented, provided for, in a convenient format, the retraction and processing of the infrared images from the SMS-2 satellite which are obtained through the receiving station. T.M.

N80-34027# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). National Council of Scientific and Technical Research.
WORKSHOP FOR FORECASTING DROUGHTS IN NORTHEAST BRAZIL ['WORKSHOP' SOBRE PREVISAO DE SECAS PARA O NORDESTE DO BRASIL]
Nelson deJesus Parada, Luiz Gylvan Meira Filho, Antonio Divino Moura, and Vernon Edgar Kousky May 1980 221 p refs In PORTUGUESE and ENGLISH Conf. held in Sao Jose dos Campos, Brazil, 11-15 Feb. 1980
(INPE-1739-RPE/138) Avail: NTIS HC A10/MF A01

Data acquisition and atmospheric modeling of northeast

Brazilian weather parameters are discussed. Weather forecasting, drought control, and frost damage to crops are highlighted.
Transl. by S.F.

N80-34028 British Library Lending Div., Boston Spa (England).
A METHOD OF CORRECTING DAILY AND MONTHLY VALUES OF ATMOSPHERIC PRECIPITATION AND RESULTS OF TESTS ON IT
V. S. Golubev 16 Jan. 1980 19 p refs Transl. into ENGLISH from Gosudarst Gidr. Inst. (Leningrad), 1973 p 11-27 in ENGLISH; partly in RUSSIAN
(BLL-Trans-1451-(9022.549)) Avail: British Lending Div., Boston Spa, England

A method of correcting precipitation totals measured by rain gauges was worked out. An assessment was made of the readings of rain gauges located in an open area, in the light of the readings of standard gauges installed in a sheltered area, and on the assumption that the same amount of precipitation will fall on open and sheltered areas. The capture coefficient was computed for different types of rain gauges from parallel reading obtained with a standard instrument and with gauges installed on an open site. The coefficients were computed using synoptic hour readings spaced 12 hours apart, when the total precipitation recorded by the standard instrument was not less than 3 mm.
R.K.G.

N80-34029# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
WAVE INFORMATION STUDY FOR UNITED STATES COASTLINES. REPORT 1: SURFACE PRESSURE FIELD RECONSTRUCTION FOR WAVE HINDCASTING PURPOSES
William D. Corson, Donald T. Resio, and Charles L. Vincent Jul. 1980 81 p
(AD-A089150; WES/TR/HL-80-11) Avail: NTIS HC A05/MF A01 CSCL 04/2

Two sources of sea-level pressure data were used to develop a valid pressure field for wave hindcasting purposes. The fundamental information was supplied by Meteorology International Inc. (MII) on a 63 by 63 grid covering the Northern Hemisphere. Supplemental data were taken from National Weather Service (NWS) synoptic surface charts. Comparisons of MII data and NWS data indicated that the MII data are incompatible with pressure measurements near storm systems; therefore, the MII data were supplemented with NWS data in two specific areas. For storms within a specified area near the U.S. Atlantic coast, the pressure field was represented by NWS data in a fixed-area grid. For storms outside the fixed-area grid, the pressure field was reconstructed from MII data blended with NWS data.
GRA

N80-34030# California Univ., Davis. Dept. of Land Air and Water Resources.
SURFACE ENERGY BUDGET OF THE TROPICAL PACIFIC OCEAN Final Report
Bryan C. Weare and Michael D. Samuel 5 Sep. 1980 36 p
(Contract N00014-79-C-0484)
(AD-A089148) Avail: NTIS HC A03/MF A01 CSCL 04/2

The four components of the net surface heating of the tropical pacific Ocean between 40 deg s and 30 deg n have been calculated for each month between January 1957 and December 1976. The 20 year monthly mean of each component were also calculated. These flux estimates were derived by using 'bulk formulae' and about five million marine weather reports. The components are averaged over 5 deg latitude by 5 deg longitude grids. Grids which did not have data in a given month were assigned interpolated values.
GRA

N80-34031# Transportation Systems Center, Cambridge, Mass. Research and Special Programs Administration.
VOICE RESPONSE SYSTEM STATISTICS PROGRAM, OPERATIONAL HANDBOOK Final Research, Apr. 1978 - Dec. 1979
Irwin Englander Jun. 1980 76 p
(AD-A089109; TSC-FAA-80-9; FAA-RD-80-76) Avail: NTIS HC A05/MF A01 CSCL 04/2

This report documents the Voice Response System (VRS) Statistics Program developed for the preflight weather briefing VRS. It describes the VRS statistical report format and contents, the software program structure, and the program operation.GRA

N80-34032# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
WIND SHEAR DETECTION WITH PULSE DOPPLER RADAR Final Report, Sep. 1977 - Sep. 1979
R. G. Strauch and W. B. Sweezy Jan. 1980 65 p refs
(Contract DOT-FA76WAI-622)
(AD-A088576) Avail: NTIS HC A04/MF A01 CSCL 17/9

The use of radar for solving the airport wind shear problem was investigated experimentally and with computer simulations. It is shown that a radar with a 150 m pulse length and a 1.5 degree beamwidth could resolve low level wind profiles. The computer simulation program was expanded so that the radar measured radial velocity profile and the field of radial velocities could be calculated and displayed for any analytic or numerical input wind model. Various output displays were available. Both the location of the radar and the volume that is scanned were chosen relative to the input coordinate system. The program also accepted input wind models expressed relative to the approach path. Effects of antenna beamwidth and radar range resolution were simulated. The program is useful for studying the expected observations for any radar (or laser) Doppler system.
R.C.T.

N80-34033# RAND Corp., Santa Monica, Calif.
MILITARY WEATHER CALCULATIONS FOR THE NATO THEATER: WEATHER AND WARPLANES 8 Interim Report
R. E. Huschke, R. R. Rapp, and C. Schutz Apr. 1980 142 p refs
(Contract F49620-77-C-0023)
(AD-A088549; RAND/R-2401-AF) Avail: NTIS HC A07/MF A01 CSCL 15/7

Fourteen weather data analyses applied to military problems are presented. These are selected from past, hitherto unpublished, contributions to Rand Corporation research projects. Emphasis is divided between (1) statistical presentations of weather variables that effect aircraft operations, mainly ceiling and visibility, jointly and independently, and (2) model generated statistics of atmospheric parameters that effect visual and infrared transmission, and target detection probabilities. Calculations are for the NATO theater with heavy emphasis on Germany.
Author

N80-34034# RAND Corp., Santa Monica, Calif.
AEROSOL MODELLING FOR OPTICAL WEATHER Final Report, 1 Sep. 1977 - 28 May 1980
D. Deirmendjian Jul. 1980 9 p refs
(Contract DAAG29-77-C-0045)
(AD-A088563; RAND/AR-2417-ARMY; ARO-15421.2-GS)
Avail: NTIS HC A02/MF A01 CSCL 04/2

A review of recent literature indicates that there is fairly good progress in the understanding of the growth of aerosols with increasing relative humidity. However, the forecasting of visibility on the basis of meteorological parameters alone is possible with moderate success only.
Author

N80-34035# Naval Postgraduate School, Monterey, Calif. Dept. of Meteorology.
EXPERIMENTS CONCERNING CATAGORICAL FORECASTS OF OPEN-OCEAN VISIBILITY USING MODEL OUTPUT STATISTICS M.S. Thesis
Philip George Yavorsky and Robert J. Renard Jun. 1980 89 p refs
(AD-A088790; NPS63-80-002) Avail: NTIS HC A05/MF A01 CSCL 04/2

This study is an extension of previous statistically oriented research at the Naval Postgraduate School. The method of Model Output Statistics is used to predict open-ocean visibility employing stepwise-selection, multiple linear regression. The visibility predictand is specified categorically with comparisons made to a previous probabilistic approach. Predictors include direct and derived model output parameters provided by the U.S. Navy's Fleet Numerical Oceanography Center (FNOC), Monterey, California. About 18,000 North Pacific Ocean (30 deg - 60 deg n) synoptic ship reports at 0000 GMT from June 1976 and 1977, July 1979, and August 1979 were used as both dependent

and independent data sets. Visibility equations for both analysis time and 24 and 48 hr prognostic times are developed, and are verified using percent correct, Heidke skill score and bias. Levels of skill are less than desirable for operational use. Important predictor parameters are found to be sensible and evaporative heat fluxes, meridional wind component, sea-level pressure, air/sea temperature difference, relative humidity, an FNOC fog probability parameter and a visibility parameter derived from a marine aerosol model. Other experiments concerning weighted least squares, predictand transformations and R2 deflation are briefly described. GRA

N80-34036# Naval Research Lab., Washington, D. C. Environmental Sciences Div.
ICING CHARACTERISTICS OF LOW ALTITUDE, SUPERCOOLED LAYER CLOUDS, REVISION Interim Report, Feb. - Oct. 1980
Richard K. Jeck May 1980 73 p refs Revised
(Contract DOT-FA79WAI-020)
(AD-A088892; FAA-RD-80-24-Rev) Avail: NTIS HC A04/MF A01 CSCL 04/2

A limited amount of new data has been obtained on the icing environment during initial airborne measurements aimed at developing environmental icing criteria for use in certifying helicopters for flight into icing conditions. Supercooled cloud characteristics are reported for 12 icing events encountered at temperatures from -10 C to 0 C at altitudes from 3500 to 6500 ft above the surface of Lake Erie and Lake Michigan. Recorded droplet size spectra from a Particle Measuring Systems Axially Scattering Probe (ASSP) were used to compute droplet mass (volume) median diameter (MMD) and, in addition to a Johnson-Williams LWC Indicator, the liquid water content (LWC). A review of available historical data from 1944-1950, upon which the atmospheric icing standards of Appendix C, FAR 25 were based, reveals that data obtained from measurements of ice accretion on multidiameter cylinders are subject to a number of significant errors of both signs. These probable errors, which will continue to be evaluated, may be responsible for the conclusions that: (1) the historical LWC values are generally larger than those observed in the flights described in this report; (2) the historical MMDs appear to be generally too small for all values of LWC; and (3) the historical droplet size distributions are unreliable, as is acknowledged in the later historical literature. GRA

N80-34037# Air Force Geophysics Lab., Hanscom AFB, Mass. Meteorology Div.
AUTOMATION OF VISUAL WEATHER OBSERVATIONS Final Report
H. Albert Brown 1 Apr. 1980 35 p refs
(AF Proj. 6670)
(AD-A088881; AFGL-TR-80-0097; AFGL-IP-286) Avail: NTIS HC A03/MF A01 CSCL 04/2

A study was performed to determine the feasibility of objectively and automatically determining two key components of an aviation weather observation: present weather and obstruction to vision. The automated system utilized was an instrumented tower and surface array of sensors located at the AFGL Weather Test Facility (WTF), Otis AFB, Massachusetts. The objective method consisted of a decision-tree program (AUTO) based on several uniquely different responses by these weather sensors to the same weather phenomena and on discrimination techniques using tower and surface instrument comparison. The ability of AUTO to monitor rapidly changing weather events and to discriminate different types of weather is demonstrated through selected hourly periods of observations taken at 1 min intervals. Hourly observations generated over a 14 month period, March 1978 through April 1979, are compared with FAA observations to determine the effectiveness of AUTO. Major areas of agreement were found in the discrimination of fog, haze, snow, rain, and no weather. Final results show that the FAA observations of the existence and non-existence of obstructions to vision and present weather were duplicated in 82 and 86% of the cases. Thus the acquisition of real weather for an aviation weather observation, a duty presently performed by a human observer, is obtainable through an objective decision-tree program using an automated sensor array. GRA

N80-34038# National Weather Service, Salt Lake City, Utah. Western Region.
NMC MODEL PERFORMANCE IN THE NORTHEAST PACIFIC
James E. Overland Apr. 1980 27 p refs Sponsored by NOAA
(PB80-196033; NOAA-TM-NWS-WR-151; NOAA-80051301) Avail: NTIS HC A03/MF A01 CSCL 04B

Central pressure and position errors of low centers for 36 hr sea-level pressure forecasts were compared between the Limited Area Fine-Mesh Model (LFM-11) and 6-level hemispheric model (6LPE) models for December 1977 and the LFM-11 and LPE models for 19 January through 28 February 1978. Nine storms provided 41 cases in December and 20 storms provided 66 cases in January through February. During December, the LFM-11 was superior to the 6LPE in locating rapidly moving storms. The position errors for the LFM-11 in December were on the order of 250 km. During February, the LFM-11 and the 7LPE had median position errors on the order of 450 km; also, both had a high percentage (25%) of observed-but-not-forecast low centers. The larger errors in February were related to resolution of initial cyclogenesis. GRA

N80-34039# National Oceanic and Atmospheric Administration, Miami, Fla. Research Facilities Center.
DETERMINATION OF ATMOSPHERIC WATER VAPOR FROM DEWPOINT MEASUREMENT
H. H. Grote Apr. 1980 85 p refs
(PB80-197189; NOAA-TM-ERL-RFC-5; NOAA-80050901) Avail: NTIS HC A05/MF A01 CSCL 04B

Frequently used information on parameters related to water vapor and dewpoint was compiled. First the saturation vapor pressure over water was expressed by an equation that had the dewpoint as input and approximated the values given in the Smithsonian Tables. This equation formed the basis for all further discussions. An equation was given for the conversion of a measured dewpoint to equivalent dewpoint at sea level. For aircraft measurements the error in dewpoint was tabulated for differences between the actual static pressure and the measured value. Then equations for absolute and relative humidity and virtual temperature were derived. Curves for the Poisson constant are given. GRA

N80-34040# National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
GREAT LAKES DEGREE-DAY AND TEMPERATURE SUMMARIES AND NORMS, 1897 - 1977
R. A. Assel Jan. 1980 120 p refs
(PB80-195977; GLERL-15; GLERL-CONTRIB-202; NOAA-80051201) Avail: NTIS HC A06/MF A01 CSCL 04B

Daily maximum and minimum air temperatures at 25 locations on the perimeter of the Great Lakes for the period 1897 to 1977 were used to generate long terms means of daily air temperatures and freezing and thawing degree-days (FDD's and TDD's). In addition daily, weekly, and monthly FDD's and daily TDD's were calculated for the 81 summer and 80 winter seasons between 1897 and 1977. The computational procedure is described. Graphs and tables resulting from this analysis are presented. GRA

N80-34041# National Oceanic and Atmospheric Administration, Washington, D. C. Federal Coordinator for Meteorological Services and Supporting Research.
THE FEDERAL PLAN FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH, FISCAL YEAR 1981
T. B. Owen Mar. 1980 120 p
(PB80-199482; FCM-80-3; NOAA-80051901) Avail: NTIS HC A06/MF A01 CSCL 04B

This Federal Plan is the sixteenth in an annual series, produced in compliance with Section 304 of Public Law 87-843, to provide the Congress with a description of governmental programs in meteorology, and to outline the specific functions and funding requested by each agency involved. GRA

N80-33814# Royal Signals and Radar Establishment, Malvern (England). Meteorological Office Radar Research Lab.
STRUCTURE, MECHANISM AND PREDICTION OF OROGRAPHICALLY ENHANCED RAIN IN BRITAIN

K. A. Browning *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 85-114 refs revised (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

N80-33815# National Center for Atmospheric Research, Boulder, Colo.
MOUNTAIN WAVES AND MOMENTUM FLUX
J. B. Klemp and D. K. Lilly *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 115-141 (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

N80-33818# European Centre for Medium-Range Weather Forecasts, Reading (England).
CYCLOGENESIS IN THE LEE OF OROGRAPHY AND ITS NUMERICAL MODELING WITH SPECIAL REFERENCE TO THE ALPS
S. Tibaldi *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 207-232 refs Presented at the GFD Symp.of the 5th EGS Meeting, Strasbourg, France, 29 Aug. - 1 Sep. 1978 Revised (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N80-34042 Hawaii Univ., Honolulu.
LOW FREQUENCY TEMPERATURE FLUCTUATIONS IN THE UPPER 400 METERS OF THE CENTRAL NORTH PACIFIC Ph.D. Thesis
Yong Quin Kang 1980 143 p
Avail: Univ. Microfilms Order No. 8022656

The low frequency temperature fluctuations, with time scales of months to years, in the upper 400 m of the Centeral North Pacific are investigated by analyzing the TRANSPAC temperature data collected as a part of the North Pacific Experiment and the temperature data at ocean weather stations. The low frequencies temperature functions consist of large scale, quasi-homogeneous, fluctuations with space comparable to the size of the North Pacific basin and smaller scale, wave-like, fluctuations with length scales of a few hundred kilometers. In the upper 100 m of the ocean the temperature fluctuation is predominantly a seasonal variation, the amplitude of which descreases with depth with a typical e-folding depth of 50 m. The nonseasonal temperature anomaly field has a two layer structure: the temperature anomalies in the surface layer, down to about 100 m, have time scale of 2 to 3 years, and those in the lower layer deeper than 150 m, have time scale of 4 to 7 years and penetrate down to a few hundred meters. More than half of the wave-like temperature fluctuations at the annual frequency consist of a random field of first order baroclinic Rossby waves traveling in a NW direction with wave lengths of about 300 km and phase speeds of about 1 cm/sec. Dissert. Abstr.

N80-34043 Miami Univ., Coral Gables, Fla.
A TWO-DIMENSIONAL DIABATIC ISOPYCNAL MODEL OF A COASTAL UPWELLING FRONT Ph.D. Thesis
E-Chien Foo 1980 124 p
Avail: Univ. Microfilms Order No. 8022880

A two dimensional high resolution diabatic isopycnal model is designed to simulate coastal upwelling frontogenesis under favorable longshore wind stress. Diabatic effects are generated by vertical mixing of density. The vertical eddy coefficients are determined explicity from the mean field gradient by either a Richardson number related formula or a second order moment closure turbulence model. The vertical turbulent mixing in a frontal region has more complicated effects than a simple downward diffusion of heat and momentum. Changing the density and momentum profiles in a water column affects the horizontal density and momentum gradients for the surrounding area. Thus, the frontal scale secondary circulation is affected. It is this secondary circulation pattern which induces concentrated upwelling flow away from the coast. This flow may be important in increasing localized nutrient concentration and inducing patches of high biological productivity water. Dissert. Abstr.

N80-34044 Oregon State Univ., Corvallis.
A MODEL OF WIND-FORCED VISCOUS CIRCULATION NEAR COASTAL BOUNDARIES Ph.D. Thesis
Michael Cornelius Spillane 1980 98 p
Avail: Univ. Microfilms Order No. 8022975

A time dependent model for the response to atmospheric forcing of a homogeneous ocean overlying a continental shelf is considered. The effect of friction is parameterized with surface and bottom Ekman layers of finite thickness. With a Fourier decomposition over frequency and alongshore wavenumber, a second order differential equation for the sea surface profile results. This is solved numerically. In particular, when forcing by the alongshore wind stress alone is considered, with no across shelf variation in this component, the special properties of the model may be described in terms of a set of transfer functions for coastal sealevel and the velocity field. With an assumed wavenumber dependence for the alongshore wind-stress, computed model predictions of the frequency response of the shelf are formed and compared with the wind coherent sealeval and horizontal currents on the Oregon shelf. The close agreement found indicates that the viscous, barotropic response to alongshore wind stress forcing. Dissert. Abstr.

N80-34045 Texas A&M Univ., College Station.
A NUMERICAL STUDY OF MOTION AND SPINDOWN CHARACTERISTICS OF AN ISOLATED CYCLONIC OCEANIC VORTEX Ph.D. Thesis
David Clement Smith 1980 113 p
Avail: Univ. Microfilms Order No. 8023070

The motion and spindown characteristics of oceanic mesoscale vortices were examined through the use of a finite difference equivalent barotropic numerical model. Variable parameters include vortex size, nonlinear strength and initial profile shape. Both Gaussian and a nonGaussian fit to an observed current ring are used as initial profiles. A time dependent behavior is observed in which the vortex approaches a quasi-equilibrium velocity. Results show vortex velocity to be a function of all three variables. Energy transfer processes are found to be significantly influenced by vortex initial profile shape. Nonlinearity is shown to stabilize the ring against dispersive effects. Vortex decay as a function of size and strength is parameterized in terms of lateral spreading of energy. Barotropic instability in several strongly nonlinear nonGaussian experiments results in a rapid breakdown of the initial vortex. Dissert. Abstr.

N80-34046 California Univ., San Diego, La Jolla.
LOW FREQUENCY SEA LEVEL VARIABILITY ALONG THE WEST COAST OF NORTH AMERICA Ph.D. Thesis
Dudley Boyd Chelton, Jr. 1980 231 p
Avail: Univ. Microfilms Order No. 8023092

The use of linear statistical estimators to examine dynamical models is discussed and the importance of using multiple input statistical models rather than a series of single models is emphasized. A methodology is described for determining the effects of statistical uncertainty in both time and frequency domain multiple input statistical models. These methods were used to examine 30 years of nonseasonal tide gauge and steric sea level data along the west coast of North America. The nature and causes of nearshore oceanic variability over short term climatic time scales of months to years were investigated. After the tide gauge records were corrected for the inverse barometric effects of atmospheric pressure, it was found that there was close agreement between the two measures of sea level at frequencies less than 1 cycle/year. At higher frequencies the steric sea level variations measured relative to 500 db and were on average, only about 1/2 as large as high frequency tide gauge sea level variations. Dissert. Abstr.

N80-34047 Oregon State Univ., Corvallis.
PROPERTIES OF THE OCEANS REFLECTED IN THE SEA-BED DISTRIBUTION OF QUATERNARY PLANKTONIC FORAMINIFERA: INCLUDING A STUDY OF THE LIMITS OF EMPIRICAL PALEO-OCEANOGRAPHIC MODELS AND THE RECOGNITION AND INTERPRETATION OF FAUNAL ASSEMBLAGES LACKING MODERN COUNTERPARTS

Ph.D. Thesis
Paul Walter Loubere 1980 118 p
Avail: Univ. Microfilms Order No. 8022970

Hydrographic features of the upper ocean that were deciphered from the sea-bed relative abundances of species of planktonic Foraminifera as described. More than sea-surface temperature is reflected in these data. The disrupting effects of species responses to nonthermal factors on certain empirical temperature estimating faunal equations (e.g., Imbrie and Kipp transfer functions) were examined. Dissert. Abstr.

N80-34048*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ASSESSMENT OF THE ROLE OF REMOTE SENSING IN THE STUDY OF INLAND AND COASTAL WATERS
Howard J. Curfman, John D. Oberholtzer, and Ronald J. Schertler Sep. 1980 70 p refs
(NASA-TM-81881) Avail: NTIS HC A04/MF A01 CSCL 08C

Several problems within Great Lakes, coastal, and continental shelf water were selected and organized under the topical headings of Productivity, Sedimentation, Water Dynamics, Eutrophication, and Hazardous Substances. The measurements required in the study of each of the problems were identified. An assessment was made of the present capability and the potential of remote sensing to make these measurements. The relevant remote-sensing technology for each of these classifications was discussed and needed advancements indicated. T.M.

N80-34049# National Research Inst. for Oceanology, Stellenbosch (South Africa). Coastal Engineering and Hydraulics Div.
TIDAL PREDICTION PROGRAM
A. M. Shipley Jan. 1980 34 p refs
(CSIR-SEA-8001; ISBN-0-7988-1567-1) Avail: NTIS HC A03/MF A01

A tide table program was developed. When a slack water time was found it was in hours from the start of the year. The program converted this to hours and minutes on a relevant calendar date and computed the corresponding water level. The time and water level were printed out on the line appropriate to the particular day of the week and the month in question. After a tide table was printed out, the program printed out a table of the highest and lowest predicted tides for each month and also for the year as a whole. T.M.

N80-34050# Royal Australian Navy Research Lab., Edgecliff.
CLIMATIC MAPS OF THE SEA SURFACE-AIR DIFFERENCE IN VAPOUR PRESSURE AND IN POTENTIAL TEMPERATURE OVER THE EASTERN INDIAN OCEAN
A. Hirst 20 May 1980 31 p refs
(AD-A089022; RANRL-TN-4/80; AR-001-505) Avail: NTIS HC A03/MF A01 CSCL 08/10

Maps are presented in this report showing, (1) the mean difference between the vapour pressure at the sea surface and at a height at 10 m, and (2) the mean difference between the potential temperature at the ocean surface and at a height of 10 m, over the ocean surface from 5 deg S to 50 deg S and from 100 deg E to 140 deg E, for the months of February, May, August and November. The maps are derived from maps of relevant variables shown in the World Ocean Atlas (1976). The sizes of errors in the maps presented here are discussed. The largest errors arise from errors in the W.O.A. maps. GRA

N80-34051# Drexel Inst. of Tech., Philadelphia, Pa. Wave Propagation Research Center.
LONG WAVE TRAPPING BY A LINEAR RIDGE TOPOGRAPHY
Richard Paul Shaw and Wayne Neu Aug. 1980 26 p refs
(Contract N00014-79-C-0067)
(AD-A088840; Rept-119) Avail: NTIS HC A03/MF A01 CSCL 08/3

Long waves are affected by bottom topography and under certain conditions may be trapped along topographical contours which then act as wave guides transmitting wave energy for great distances with little loss. This study examines waves trapped along a submerged ridge described by straight parallel bottom contours which in cross section are composed of constant slope segments bounded on either side by constant depth segments. Solutions are found for time harmonic waves periodic in the along ridge direction and of exponential decay behavior normal to the ridge over the constant depth segments. Over the linearly varying topography describing the ridge, the solution is in terms of two Kummer (or Whittaker) functions. For a given geometry, a dispersion equation is obtained relating the wave frequency to the along ridge wave number for trapped waves. A constant Coriolis parameter is included, but primary interest is on class I (high frequency) waves. A comparison of cutoff frequencies predicted for this piecewise continuous ridge and those for a segmented constant depth ridge is made, and the appropriate scaling factors between the two results are discussed. GRA

N80-34052# National Weather Service, Salt Lake City, Utah. Western Region.
THE SWAB (SPECTRAL WAVE AND BAR) PROGRAM
Morris Webb, S., Jr. (Weather Service Forecast Office, San Francisco) Mar. 1980 36 p refs Sponsored by NOAA
(PB80-196041; NOAA-NWS-WRCP-9; NOAA-80051302) Avail: NTIS HC A03/MF A01 CSCL 08C

The SWAB (Spectral Wave and Bar) program allows the wave forecast technique developed by the School of Oceanography at Oregon State University to be used in AFOS. Variables describing the SWAB to produce a forecast out to 48 hours of significant wave height and period at a given point. This forecast along with data from the National Ocean Survey's Tidal Current Tables, is used to predict bar conditions at a time of maximum ebb current at several locales. GRA

N80-34053# National Technical Information Service, Springfield, Va.
OCEAN WAVE SENSING. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jun. 1980
Audrey S. Hundemann Jul. 1980 271 p Supersedes NTIS/PS-79/0663 and NTIS/PS-78/0560
(PB80-812878; NTIS/PS-79/0663; NTIS/PS-78/0560) Avail: NTIS HC $30.00/MF $30.00 CSCL 08C

Abstracts pertaining to methods and equipment for measuring ocean waves and sea surface roughness are presented. Remote sensing of ocean waves, height indicators, wave spectrum measurement, the use of radar, wave direction detection, and a few abstracts dealing with general studies are included. This updated bibliography contains 263 citations, 11 of which are new entries to the previous edition. GRA

N80-33817# Woods Hole Oceanographic Institution, Mass.
EFFECTS OF BOTTOM TOPOGRAPHY ON OCEAN CURRENTS
Nelson G. Hogg *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 167-206 refs (For primary document see N80-33811 24-42)
(Contract N00014-76-C-0197; Grant NSF OCE-78-25405; NR Proj. 083-400)
Avail: NTIS HC A12/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N80-34054 British Library Lending Div., Boston Spa (England).
POLYFUNGIN, A NEW ANTIFUNGAL ANTIBIOTIC. 4: THE USE OF THIN LAYER CHROMATOGRAPHY FOR DETERMINING THE QUALITATIVE COMPOSITION OF THE POLYFUNGIN COMPLEX
Z. Plociennik, L. Halski, and Z. Kowszyk-Gindifer Jul. 1980 11 p refs Transl. into ENGLISH from Chem. Anal. (Warsaw), v. 18, 1973 p 151-156
(BLL-RTS-12381) Avail: British Library Lending Div., Boston Spa, England

A quick and simple method for determining the qualitative composition of polyfungin was developed. In paper chromatography using waster-saturated butanol as the solvent system which is commonly used for separating polyene antibiotics, polyfungin behaved as a homogeneous substance. With the same solvent

system in 'pH-chromatography' polyfungin, in contrast to nystatin, tended to separate at pH 7.25. T.M.

N80-34055 British Library Lending Div., Boston Spa (England).
THEORETICAL AND APPLIED ASPECTS OF THE ANABIOSIS OF MICROORGANISMS
M. E. Beker Jun. 1980 19 p refs Transl. into ENGLISH from Izv. Akad. Nauk. Latv. (USSR), no. 5, 1978 p 23-31 (BLL-RTS-12350) Avail: British Library Lending Div., Boston Spa, England

The behavior of living organisms in extreme conditions was studied. The influence of anabiosis on agriculture and atmospheric composition is discussed. Utilization of aerobes is also discussed. T.M.

N80-34056*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HUMAN ACCLIMATION AND ACCLIMATIZATION TO HEAT: A COMPENDIUM OF RESEARCH, 1968-1978
Deanna Sciaraffa, Stephen C. Fox, Ralph Stockmann, and John E. Greenleaf Aug. 1980 104 p refs (NASA-TM-81181; A-8099) Avail: NTIS HC A06/MF A01 CSCL 06P

Abstracts and annotations of the majority of scientific works that elucidate the mechanisms of short-term acclimation to heat in men and women are presented. The compendium includes material from 1968 through 1977. Subject and author indexes are provided and additional references of preliminary research findings or work of a peripheral nature are included in a bibliography. T.M.

N80-34057*# Stanford Univ., Calif. Instrumentation Research Lab.
CYTOCHEMICAL STUDIES OF PLANETARY MICROORGANISMS EXPLORATIONS IN EXOBIOLOGY Final Report, 1 Apr. 1980 - 30 May 1980
Elliott C. Levinthal Jun. 1980 296 p (Grants NGR-05-020-004; NsG-8160) (NASA-CR-163605; IRL-1213) Avail: NTIS HC A13/MF A01 CSCL 06C

Experiments to identify free living organisms in soils that may be substantially simpler in genetic content, and mirroring a more primitive stage of evolution than the species with which we are familiar to date, were designed. Organic chemical studies on the composition and disposition of elementary carbon leave nothing wanting as an aboriginal substrate for the original of life and early chemical evolution. Such studies were missed when it came to the interpretation of the Viking lander data, and needed for conceptual planning of future planetary missions. T.M.

N80-34058# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 14, NO. 4, 1980
O. G. Gazenko, ed. 12 Sep. 1980 153 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 1-139 (JPRS-76415) Avail: NTIS HC A08/MF A01

The physiological effects of flight stress in aircraft pilots and in biological specimens subjected to weightlessness and artificial gravity are considered with particular emphasis on the crews of Salyut 5 and 6 and experiments carried on the Cosmos 936 biosatellite. Hygienic and toxic factors associated with life support systems, radiation effects on animal tissues, and altitude acclimitization are also considered. For individual titles, see N80-34059 through N80-34083.

N80-34059# Joint Publications Research Service, Arlington, Va.
HYGIENE AND TOXICOLOGY OF HUMAN WASTE GASES c54
V. V. Kustov and L. A. Tiunov *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 1-8 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 3-7 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

Data published in the literature concerning involvement of human wastes in the formation of an artificial atmosphere of small enclosures designed for various purposes are surveyed. The applicability of theoretical data on human wastes to the solution of theoretical and practical problems of aerospace, marine, communal hygiene and clinical medicine as well as of biochemistry, physiology and other disciplines is emphasized. A.R.H.

N80-34060# Joint Publications Research Service, Arlington, Va.
CARDIORESPIRATORY SYSTEM REACTIONS OF COSMONAUTS TO EXERCISE FOLLOWING LONG-TERM MISSIONS ABOARD THE SALYUT 6 ORBITAL STATION c52
A. V. Beregovkin, A. S. Vodolazov, V. S. Georgiyevskiy, L. I. Kakurin, V. V. Kalinichenko, N. V. Koralin, V. M. Mikhaylov, and V. V. Shchigolev *In its* USSR report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 9-13 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 8-11 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

The cosmonauts who made 96 and 140 day missions aboard the Salyut 6 orbital station showed no disorders in cardiovascular function or regulation during graded exercises. The displayed certain changes that could be attributed to deconditioning upon return to 1 g. These findings give evidence that efficient cardiovascular prophylaxis to exercises in prolonged space flight is possible. Author

N80-34061# Joint Publications Research Service, Arlington, Va.
REACTIONS TO LBNP TEST OF THE CREW OF THE SALYUT 5 ORBITAL STATION c52
V. A. Degtyarev, V. G. Doroshev, Z. A. Kirillova, N. A. Lapshina, S. I. Ponomarev, and V. N. Regozin *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 14-19 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 11-16 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

During the 49 day mission (first expedition) the commander did not show a decline in LBNP tolerance, whereas the flight-engineer showed a progressive decrease in LBNP tolerance begining on the 23rd day. During the 17 day mission (second expedition) the flight-engineer exhibited greater cardiovascular reactions to LBNP than the commander. Postflight examinations confirmed the observations made in the weightless state. Author

N80-34062# Joint Publications Research Service, Arlington, Va.
PREFLIGHT DISTINCTIONS OF STAPHYLOCOCCUS AURENUS CARRIERS AMONG COSMONAUTS c52
R. Yu. Tashpulatov, T. N. Nikolayeva, and Ye. V. Guseva *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 29-25 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 16-20 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

A preflight study of Staphylococcus aureus carriage in cosmonauts demonstrated that the microganism harbors in 79.4% of the tested and microbial foci of the carriers amount to 100 ml. The isolated Staphylococcus aureus strains show a prnounced plasma coagulatory, alpha-toxic activity and 67.4% of them can be typed by the International set phages. Prophylactic administration of the native staphylococcal anatoxin increases specific antistaphylococcal immunity, reduces or eliminates completely Staphylococcus aureus in the upper respiratory airways. Author

N80-34063# Joint Publications Research Service, Arlington, Va.
STATIC ENDURANCE OF RATS AFTER FLIGHT ABOARD THE COSMOS 936 BIOSATELLITE
A. R. Kotovskaya and A. A. Shipov *In its* USSR Report: Space Biol. and Aerospace Med., vol. 14, no. 4 (JPRS-76415) 12 Sep. 1980 p 26-29 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 20-22 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

Rats exposed to an 18.5-day flight aboard the biosatellite Cosmos-936 were studied. The recovery rate of static endurance of those animals flown in an onboard centrifuge generating 1 g was similar to that of rats used as synchronous controls. It is concluded that artificial gravity helps to maintain cardiovascular, muscular and respiratory functions at an almost normal level. A.R.H.

N80-34064# Joint Publications Research Service, Arlington, Va.

COMPARATIVE STUDY OF EFFECTS OF WEIGHTLESSNESS AND ARTIFICIAL GRAVITY ON DENSITY, ASH, CALCIUM AND PHOSPHORUS CONTENT OF CALCIFIED TISSUES

A. A. Prokhonchukov, N. S. Komissarova, N. A. Zhizhina, and A. I. Voloshin *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 30-34 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 23-26 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

The mineral content of bones and teeth was examined in 5 centrifuged and 25 ground-based control rats flown for about 19 days aboard the Cosmos-936 biosatellite. Postflight, the centrifuged rats did not show significant differences in the density, mineral saturation, distribution of vascular channels in bones, ash, calcium and phosphorus content in skeletal bones and teeth as compared with the parameters in synchronous and vivarium controls. In the weightless rats these values were significantly lowered. A.R.H.

N80-34065# Joint Publications Research Service, Arlington, Va.

MORPHOLOGICAL STUDY OF RAT KIDNEYS AFTER FLIGHT ABOARD THE COSMOS-936 BIOSATELLITE

A. S. Pankova *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 35-41 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 26-31 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

Kidneys of SPF Wistar rats flown for 18.5 days aboard the biosatellite Cosmos-936 and sacrificed 4.5-13 hours or 25 days postflight were taken under morphological study. An exposure of rats to artificial gravity inflight brought about a smaller increase in the kidney mass and a better readaptation of animals on return to 1 g. It is suggested that blood redistribution in the kidneys due to renal circulation shunting and, possibly, fluid transfer from the vascular bed to interstitial space are the factors causing an increase in kidney mass. No differences in the kidneys of weightless and centrifuged rats were found. Author

N80-34066# Joint Publications Research Service, Arlington, Va.

MORPHOLOGICAL CHANGES IN RAT LUNGS AFTER FLIGHT ABOARD THE COSMOS-936 BIOSATELLITE

V. I. Yakovleva *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 42-48 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 31-35 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

Lung of 20 rats which were flown aboard Cosmos 936 for 18.5 days and sacrificed withing either 5 to 13 hours or 25 days after recovery, were studied histologically. An identical number of lung specimens were withdrawn from rats of synchronous and vivarium controls. Lungs of the flight rats dis not show any pathological changes or morphological signs of prolonged congestion, thus indicating the lack of hypertension in pulmonary circulation. Lungs of the flight rats exhibited an increased leukocyte count, which was more marked in the weightless rats killed 8 to 13 hours postflight. The elevation in the count of neutrophilic leukocytes in the flight rats was due to peripheral neutrophilia which is a manifestation of an acute stress reaction. An exposure of rats to artificial gravity was responsible for a lesser increase in the count of neutrophilic leukocytes. E.D.K.

N80-34067# Joint Publications Research Service, Arlington, Va.

TEMPLATE ACTIVITY OF CHROMATIN DNA AND THE ADENYLATE CYCLASE SYSTEM OF RAT TISSUES FOLLOWING FLIGHT ABOARD THE COSMOS-936 BIOSATELLITE

Ye. N. Troitskaya, V. F. Makeyeva, G. S. Komolova, I. A. Yegorov, and R. A. Tigranyan *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 49-53 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 35-38 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

Chromatin DNA template activity and cAMP metabolism enzymes in the liver and lymph organs of rats flown for 19 days were studied. Postflight RNA synthesis on the chromatin DNA template was increased in the liver and decreased in lymph organs. Adenylate cyclase and phosphodiesterase activities decreased in the liver and increased in lymph organs. No correlation between cAMP enzyme activity was found. The nature of the biochemical changes in animal tissues is discussed. Author

N80-34068# Joint Publications Research Service, Arlington, Va.

EFFECTS OF TRANSMERIDIONAL FLIGHTS AND HIGHLAND CONDITIONS ON DIFFERENT FORMS OF MEMORY c53

R. Yu. Ilyuchenok, L. A. Konstantinovskaya, and N. I. Dubrovina *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 54-58 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 38-41 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

During 21 day observation following an environmental change memory processes were activated: short term memory storage increased, proceptive and retroactive interference decreased, fixation of memory track improved, number of reminiscences grew, and forgetfulness lessened. These processes were especially active during 11th through 21st days of adaptation. Improvement of short term memory was found in verbal and nonverbal tests, nonverbal short term memory being changed more significantly. These findings point to the leading role of memory in the development of adaptive behavioral programs. The conclusions can be applied to the selection of optimal mental tasks given to the man after his transmeridional flight or transfer to highlands. Author

N80-34069# Joint Publications Research Service, Arlington, Va.

THE ROLE OF FUNCTIONAL ASYMMETRY OF THE CENTRAL NERVOUS SYSTEM IN PILOT PERFORMANCE c53

A. A. Gyurdzhian and A. G. Fedoruk *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 59-64 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 41-45 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

A correlation was found between pilot performance and functional asymmetry of brain hemispheres. The correlation indicates that the pilots performing their flights uneventfully show higher indices of predominance of the left hemisphere (speech perception) and the right hand as compared to the pilots who perform their flights unsuccessfully and who have cardiovascular and nervous disorders. A.R.H.

N80-34070# Joint Publications Research Service, Arlington, Va.

DISTINCTIONS OF PILOT MOTOR ACTIVITY IN DIFFERENT PILOTING MODES DURING LANDING APPROACHES c54

R. I. Brusnichkina *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 65-69 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 14, 1980 p 45-48 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

Complex motor acts of pilots during their professional work

were investigated with control information presented in a different manner. Two experimental series were run: in a real flight and in a simulator. Parameters of muscle bioelectric activity, control movements and performance efficiency were used. Differences in the formation of motor acts were shown to depend on the scope and quality of the information presented. During required transfer from one mode to another, the structure of working movements and performance efficiency continued during large changes in the information necessary for piloting. This structure was accompanied by an alteration in the developed stereotype of actions, including motor acts. A.R.H.

N80-34071# Joint Publications Research Service, Arlington, Va.

EFFECT OF PERIODIC EXPOSURE TO HEAD-PELVIS ACCELERATIONS ON A SHORT-ARM CENTRIFUGE ON RESPONSES OF THE HUMAN CARDIOVASCULAR SYSTEM c52

I. F. Vilvilyams *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 70-74 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 48-51 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

During 3 and 6 day immersion studies test subjects were two or three times a day (60 min each time) exposed to head to feet acceleration of 1-2 G in a 2m arm centrifuge. In 297 runs, cardiovascular reactions were compared with respect to their adaptation or cumulation. The results obtained show that the principle of periodic application of acceleration in a short arm centrifuge as a countermeasure against cardiovascular deconditioning can be complemented by the principle of cyclic exposures. The study demonstrated that 3 day cycles including 60 min exposures to 1-2G twice a day were most efficient. Author

N80-34072# Joint Publications Research Service, Arlington, Va.

EFFECT OF ANTIORTHOSTATIC HYPOKINESIA AND SPACE FLIGHT FACTORS ON CHANGE IN LEG VOLUME c52

I. I. Kasyan, V. A. Talavrinov, V. I. Lukyanchikov, and Ye. A. Kobzev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 75-80 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 51-55 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

A specially built sensor was used to assess variations and level of fluid redistribution as well as atrophic changes in leg muscles of subjects exposed to prolonged head down tilt and cosmonauts in a real space flight. Hypokinetic subjects were examined before, during, and after head down tilt, whereas cosmonauts were examined before and during flight. The results indicate that a change in the hydrostatic component of blood pressure is followed by displacement of a substantial fluid volume (about 7%). It is also indicated that adequate performance of preassigned countermeasures seems to prevent atrophic developments of leg muscles. R.C.T.

N80-34073# Joint Publications Research Service, Arlington, Va.

SOME OF THE PHYSIOLOGICAL EFFECTS OF 30 DAY BED REST WITH THE BODY IN DIFFERENT POSITIONS c52

B. S. Katkovskiy, V. S. Georgiyevskiy, G. V. Machinskiy, V. M. Mikhaylov, and Yu. D. Pometov *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 81-85 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 55-58 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

Eighteen male test subjects were exposed to a 30 day bed rest with the foot end of the bed tilted at ±6 deg, -2 deg or -6 deg. Control subjects were allowed a normal mode of life during the same period of time. Hypokinesia was shown to play the leading role in the genesis of most changes, since control subjects displayed no changes. It was concluded that head down tilt simulated changes occurring during adaptation to weightlessness better than recumbency or head up tilt. Author

N80-34074# Joint Publications Research Service, Arlington, Va.

CIRCADIAN RHYTHM OF HUMAN BODY TEMPERATURE IN ANTIORTHOSTATIC POSITION c52

L. Ukhagva *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 86-90 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 59-61 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

Circadian rhythms of the oral temperature were studied in three male test subjects kept for 7 days in a head down position at 8 deg. As compared to the controls (kept in a hospital for 3 days) the test subjects showed a statistically significant temperature increase (by 0.22 deg C on the average) during circadian minimum points that occured at night and a decrease of the daily temperature rhythm amplitude (by 0.20 deg on the average). It is emphasized that study of human responses to various stress agents should include monitoring of circadian rhythms of various parameters. R.C.T.

N80-34075# Joint Publications Research Service, Arlington, Va.

HISTOSTRUCTURAL CORRELATIONS IN THE HYPOTHALAMUS-HYPOPHYSIS-KIDNEYS SYSTEM UNDER HYPOKINETIC CONDITIONS

I. P. Chernov, V. A. Babayeva, and A. G. Gaffarov *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 91-98 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 62-67 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

The type and level of morphological changes in different components of the hypothalamic pituitary renal system were studied in male rats exposed to 3 month hypokinesia. A correlation between rearrangement of the interstitium and epithelium of renal collecting tubules and histophysiological parameters of the antidiuretic hormone production and secretion was established. Morphological manifestations of increased water permeability of collecting tubules recorded on test days 1-10 and 30-60 were seen together with enhanced activity of the hypothalamic supraoptic nucleus. Possible mechanisms involved in changes of the renal water excretory function during hypokinesia were examined. R.C.T.

N80-34076# Joint Publications Research Service, Arlington, Va.

EFFECT OF CONDITIONING ANIMALS FOR HYPOXIA ON THEIR RESISTANCE TO POISON INHALATION

G. D. Tikhonova and G. I. Solomin *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 99-104 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 67-71 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

The resistance of albino rats to chronic inhalation of dioxane and dichloroethane vapors after continuous and intermittent adaptation to hypoxic hypoxia was studied. The adaptation sequence (20-day continuous hypoxia at an altitude of 3,200 m and intermittent hypoxia for 6 hours a day amounting to 25 rises to an altitude of 5,000 m) influenced markedly the intoxication effect. Adaptation to hypoxia increased the alveolar capillary surface of the lung parenchyma, thus enhancing a better entry of chemicals into the body. The posthypoxic pattern of the structural rearrangement of the pulmonary tissue was similar to that observed during moderate hyperoxia. R.C.T.

N80-34077# Joint Publications Research Service, Arlington, Va.

EXPERIMENTAL STUDIES OF SETTING STANDARD FOR OPTIMUM SALT COMPOSITION OF PORTABLE WATER c54

L. I. Elpiner and O. I. Balashov *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 105-113 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 71-77 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

Water samples of various mineral contents were given to rats to determine the specificity of the body's reaction to drinking water. Results indicate that the amount of salt in drinking water determines the level of fluid intake to some extent. It is also shown that this increase in fluid intake causes an increase in both renal and extrarenal mechanisms, which subsequently results in unwarranted (from the standpoint of purposeful behavior expenditure of energy that was not required by exogenous causes. R.C.T.

N80-34078# Joint Publications Research Service, Arlington, Va.

EFFECTS OF DIFFERENT HYGIENIC FACTORS ON EXHALATION OF ACETONE BY MAN c52

V. P. Savina and T. I. Kuznetsova *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 114-117 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 77-80 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

The effect of high temperature on quantitative characteristics of metabolites eliminated in exhaled air was determined. It is shown that the concentration of acetone in exhaled air increased by 6.9 times at an ambient temperature of 32-35 C and by 11 times at a temperature of 40 C. A significant increase in emission of acetone in exhaled air was recorded during graded exercise on a bicycle ergometer (intensity 800 kg-m/min. R.C.T.

N80-34079# Joint Publications Research Service, Arlington, Va.

LESIONS TO AND RECOVERY OF MOUSE SEMINIFEROUS EPITHELIUM AFTER EXPOSURE TO RADIATION AT DIFFERENT DOSE RATES

Zh. G. Zalikina *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 118-122 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 80-83 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

Mice were irradiated with doses varying from 5 to 1200 R at dose rates of 300, 100, 10 and 2.5 R/day. In addition, mice irradiated with a dose of 300 R at dose rates of 300 and 100 R/day were followed up for 3 months. The relationship between gonad injury and the total dose range of 5 to 75 R was demonstrated. With an increase in the irradiation time, the effect was dependent on the dose rate. Author

N80-34080# Joint Publications Research Service, Arlington, Va.

THE ROLE OF TEMPERATURE IN EXPERIMENTS ON BIOLOGICAL OBJECTS UNDER EXTREME CONDITIONS

F. V. Sushkov and T. M. Smirnova *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 123-126 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 83-85 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

Mammalian cells were cultured at different temperatures in order to determine the effects of extreme factors on biological processes. It is shown that there is a need for strict control of ambient temperature when studying the effects of extreme factors on isolated mammalian cells and populations of freely living organisms that have no heat regulating systems. R.C.T.

N80-34081# Joint Publications Research Service, Arlington, Va.

MICRONUCLEI IN RAT BONE MARROW AFTER FLIGHT ABOARD THE COSMOS 936 BIOSATELLITE

T. P. Pantev, G. N. Dumova, I. I. Bpitvan, I. T. Nikolov, and S. Ts. Topalova *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 127-131 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 85-87 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

The chromosomal system of the rat's somatic cells during exposure to weightlessness, artificial gravity, and other flight factors was evaluated using the so called micronuclear (MN) test. The set of factors involved in the flight and ground based model experiments elicited distinct changes in the chromosomal system of bone marrow cells of experimental animals. There was a 7-8-fold increase in percentage of cells with MN in animals that were in weightlessness during the space flight, and a 5-fold increase in those in the ground based model experiment, as compared to the vivarium control. The absence of statistical differences in incidence of appearance of cells with MN in the bone marrow of rats submitted to weightlessness and rats in the ground based experiment warrants the assumption that the aggregate of unusual living conditions (hypodynamia, isolation, gas environment, etc.), rather than absence of gravity, was the cause of the demonstrated changes. R.C.T.

N80-34082# Joint Publications Research Service, Arlington, Va.

ANALYSIS OF CHANGES IN EVOKED BIOELECTRICAL ACTIVITY OF THE BRAIN DURING EXPOSURE TO HIGH-INTENSITY STATIONARY MAGNETIC FIELD c53

L. D. Klimovskaya *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 132-136 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 88-90 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

The effect of a stationary magnetic field was investigated by means of altering the functional state of the central nervous system in rats. This was done by administering strychnine as well as a high frequency stimulation to the reticular formation of the midbrain. Significant results are reported. R.C.T.

N80-34083# Joint Publications Research Service, Arlington, Va.

DISTRIBUTION OF BENZENE IN TISSUES OF HYPOKINETIC ANIMALS

G. P. Babanov and A. L. Isakhanov *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-56415) 12 Sep. 1980 p 137-139 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 90-91 (For primary document see N80-34058 24-51)

Avail: NTIS HC A08/MF A01

A total of 16 albino rats were divided into two groups of eight and subjected to eight weeks of hypokinesia. After this time, rats from the control (usual motor activity) and experimental (hypokinesia) were submitted to 4 h inhalation of benzene and subsequently decapitated. A bioassay was then performed on the tissues of the liver, kidney, lungs, spleen, adrenals, heart, sternum, femoral muscle, brain, and the blood. It was established that permeability of most tissues was higher for the nonelectrolyte in hypokinetic animals than controls. In control animals, maximum amounts of benzene were demonstrable in the adrenals, omentum, liver and sternum, and the distrubution of benzene in hypokinetic animals was essentially similar to the control. Benzene accumulated the most in the adrenals, although a tendency toward decline was observed, as compared to the control. Benzene accumulated to a lesser extent in the omentum of experimental animals, which was apparently attributable to the fact that the store of fat in it was rather insignificant, as compared to the control. R.C.T.

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N80-34084 British Library Lending Div., Boston Spa (England).

APPLICATION OF A COMPUTER PROGRAMME FOR THE DETERMINATION OF RADIOIMMUNOLOGICAL MEASURED VALUES

W. Huber, K. Mann, and H.-J. Karl [1979] 14 p Transl. into ENGLISH from Z. Klin. Chem. Klin. Biochem. (West Germany), v. 17, no. 4, 1979 p 241-246 Presented at 2d Clinic of the Medical Centre, Munich, 1978

(BLL-RTS-12046) Avail: British Library Lending Div., Boston Spa, England

A computer program was modified and further developed for the purpose of determining radiommunological measured values. The following points are emphasized: (1) adaptation of programming to a Siemens 4004/151 computer with ancillary equipment such as punched-tape reader, terminal, disc files and high speed printer; (2) automation of control sequence ensuring that the programmer will not be required to enter data or build up instructions; (3) reproducible smoothness of Spline Functions, which will respond to objective criteria and which will allow for the requirements of quantitative evaluation; and (4) output of different parameters for data evaluation and for long term recording of assay stability. R.C.T.

N80-34085 Case Western Reserve Univ., Cleveland, Ohio.
HUMAN LUNG VENTILATION, MECHANICS AND MORPHOLOGY Ph.D. Thesis
Richard Brainerd Salmon 1980 177 p
Avail: Univ. Microfilms Order No. 8021715

The relationship among inhomogeneities of ventilation, mechanics, and morphology in postmortem human lungs were investigated. Ventilation inhomogeneity was assessed by the end-inflation Xe-133 distribution and the single breath washout (SBW) of nitrogen. During the SBW, transpulmonary pressure, volume, and rate of volume change were simultaneously measured. The distribution of alveolar surface-to-volume ratio (ASVR) and membranous airway diameter (MAD) were found from microscopic analysis of lung sections. Since there was no apex-to-base gradient and ASVR or MAD, the apex-to-base gradient in Xe-133 results not from inhomogeneities in mechanical properties, but from gravity induced stress inhomogeneities. Dissert. Abstr.

N80-34086 California Univ., San Diego.
DEVELOPMENT AND APPLICATION OF A BRAIN STEM AUDIOMETER Ph.D. Thesis
Peter James Talmachoff 1980 159 p
Avail: Univ. Microfilms Order No. 8023116

A brain stem audiometer with a novel digital stimulus generator was designed and constructed. The stimulus generator produces pure sinewaves as well as shaped tone pips or logons. The envelope for the logon is a Gaussian function which provides a bandwidth of approximately 1.5 octaves and a duration of 3.5 cycles. The duration of the logon can be increased by interposing any number of cycles of a sinewave between the tapered ends of the function, with a resultant decrease in bandwith. The logon and sinewave functions are stored in a read only memory and are read out at varying clock rates to produce the desired stimulus frequencies. A number of physiological studies were performed using the logon stimulus at 500 Hz. At high repetition rates, a large sinusoidal baseline shift with a period equal to the interstimulus interval was observed in many subjects. Dissert. Abstr.

N80-34087 Iowa Univ., Iowa City.
NEW ENGINEERING APPROACHES TO NONINVASIVE HIS-PURKINJE SYSTEM RECORDINGS Ph.D. Thesis
Edward Joseph Berbari 1980 244 p
Avail: Univ. Microfilms Order No. 8022002

A more global approach to recording all the electrical information generated by the His-Purkinje System (HPS) was developed. Recording lead systems, particularly those using an esophageal electrode or orthogonal surface leads, were investigated. The bandwidth requirements of HPS activity resulting in limited use of preconditioning analog filters and relying on zero phase response digital filters are presented. Statistics were used to estimate noise levels and measure confidence intervals for the averaged recordings. A first order model based upon independently arrived at results in anatomy, physiology, and biophysics was developed. Three new lead systems were evaluated. Two of these were based on a swallowable esophageal electrode and formed either a bipolar lead within the esophagus or a transthorac lead with one electrode in the esophagus and the other on the chest. The third lead system was formed with bipolar surface leads configured in an x,y,z orthogonal scheme. Dissert. Abstr.

N80-34088* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY. A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 210, SEPTEMBER 1980
Sep. 1980 46 p
(NASA-SP-7011(210)) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 06E

This bibliography lists 115 reports, articles, and other documents introduced into the NASA Scientific and Technical Information System in August 1980. Author

N80-34089 Texas Univ. at Arlington.
DIFFERENCES IN CERTAIN PHYSIOLOGICAL, BIOMECHANICAL, AND SUBJECTIVE MEASURES OF WORK EFFECT BETWEEN MALES AND FEMALES WHILE BACK-PACKING Ph.D. Thesis
John William Priest 1980 209 p
Avail: Univ. Microfilms Order No. 8022978

Eighteen male and female subjects between the ages of 20 and 30 years carried backpack loads of 20, 25, and 30 percent of their body weight on a treadmill for 30 minutes. The subjects selected had an average or above physical work capacity and were nonstudents who currently work in an office environment. Selected areas of evaluation included differences in physiological, biomechanical, and subjective measures of fatigue. Differences between men and women to a significance level were found for oxygen consumption and on the basis of oxygen consumption per kilogram weight. Female subjects consumed less oxygen due to their lower body weight but had a higher level of oxygen consumption when body weight was taken into account. No significance was found for trunk inclination or ratings of perceived exertion. Dissert. Abstr.

N80-34090 Texas Technological Univ., Lubbock.
EFFECT OF TASK VARIABLE INTERACTIONS IN LIFTING AND LOWERING Ph.D. Thesis
Anil Mital 1980 187 p
Avail: Univ. Microfilms Order No. 8022828

An experiment to study the effect of several task variables on the metabolic energy expenditure and heart rate of individuals when performing lifting and lowering tasks was conducted. The task variables studied were: load of lift (lower); frequency of lift (lower); height of lift (lower); presence or absence of handles, container height, container width (in the frontal plane), and container length (in the sagittal plane). The data were analyzed separately for lifting and lowering, using the analysis of variance. Container height did not affect the metabolic energy expenditure or heart rate of the subjects for lifting or lowering activities. Presence or absence of handles did not cause a significant change in the physiological responses for lowering tasks. All other task variable effects, however, were significant. A strong first and second order interaction was observed among the task variables. Higher load levels, frequency of lift (lower), vertical height of lift, box width, and box length resulted in increased metabolic energy expenditure and heart rate. Dissert. Abstr.

N80-34091 Washington Univ., St. Louis, Mo.
A STUDY OF HUMAN THROAT-WALL AND VOCAL TRACT FROM INPUT/OUTPUT MEASUREMENTS Ph.D. Thesis
Nageswara-Rao Vemula 1979 203 p
Avail: Univ. Microfilms Order No. 8018768

Simultaneous measurements of the sound pressure at the lips and the vibration on the neck were made during vowel phonation. An approximation to the glottal source signal was determined from the measured vibration signal using autoregressive moving-average model for the wall. The tract was considered as an autoregressive system and its shape was determined by relating its transfer function coefficients to a nonuniform acoustic tube model. By introducing controlled changes in the tract shape, for example, inserting a wood piece of known dimensions into the tract, creating a tongue hump at the lip-end, etc., the present approach gives more consistent tract shapes than the Linear Predictor procedure. This approach gives reasonable shapes for vowel phonation. Dissert. Abstr.

N80-34092 Tulane Univ., New Orleans, La.
MATHEMATICAL SIMULATION OF THE TRANSPORT OF OXYGEN AND IMPORTANT METABOLITES IN THE HUMAN BRAIN Ph.D. Thesis

Ronald Stephen Artigue 1980 199 p
Avail: Univ. Microfilms Order No. 8023464

Mathematical models of the transport of oxygen and the simultaneous transport of carbon dioxide, glucose and lactic acid within the microcirculation of the human brain were developed. These were solved for both steady state and dynamic cases which included normal and pathological conditions. The models are distributed parameter interactive systems of nonlinear partial differential equations. These were reduced to finite difference equations and solved using various numerical techniques. All three models employ the Price Varga Warren finite difference approximations for the capillary equations. The steady state constant tissue metabolism model (SSCM) requires an analytical steady state radial mass flux from the capillary. The dynamic nonlinear tissue metabolism model uses Crank Nicolson analogs in solving the nonlinear, radial diffusion tissue equations. The third model is similar to the DNLM model but also includes axial diffusion in the tissue. S.F.

N80-34093*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HEALTH REQUIREMENTS FOR ADVANCED COAL EXTRACTION SYSTEMS
Wayne F. Zimmerman 15 Sep. 1980 28 p refs
(Contracts NAS7-100; DE-AI01-76ET-12548)
(NASA-CR-163265; JPL-Pub-80-72) Avail: NTIS HC A03/MF A01 CSCL 06J

Health requirements were developed as long range goals for future advanced coal extraction systems which would be introduced into the market in the year 2000. The goal of the requirements is that underground coal miners work in an environment that is as close as possible to the working conditions of the general population, that they do not exceed mortality and morbidity rates resulting from lung diseases that are comparable to those of the general population, and that their working conditions comply as closely as possible to those of other industries as specified by OSHA regulations. A brief technique for evaluating whether proposed advanced systems meet these safety requirements is presented, as well as a discussion of the costs of respiratory disability compensation.
Author

N80-34094# Naval Submarine Medical Research Lab., Groton, Conn.
AIDS FOR IMPROVING VISION IN WHITE-OUT Interim Report
C. L. Schlichting, S. M. Luna, J. A. S. Kinney, D. F. Neri, and S. W. Kindess 13 Aug. 1980 29 p refs
(AD-A088726; NSMRL-937) Avail: NTIS HC A03/MF A01 CSCL 06/19

The ability to see well deteriorates markedly under conditions of uniform visual stimulation (white-out). These conditions are frequently encountered by both the Navy and Marine Corps troops operating in winter environments. This study tested two different visual aids in an attempt to improve vision under these conditions. One of the aids, a yellow goggle, showed promise for improving the perception of depth in both low light and snow conditions. The other, a correction for empty-field myopia (nearsightedness induced by a featureless visual field) did not improve vision. Further research is planned to specify more precisely the conditions in which the yellow goggles improve vision, and to investigate the reasons for the failure of the lenticular corrections to improve vision. GRA

N80-34095# SRI International Corp., Menlo Park, Calif.
DEVELOPMENT AND VALIDATION OF METHODS FOR SAMPLING AND ANALYSIS OF WORKPLACE TOXIC SUBSTANCES *Final Report, Jul. 1978 - Nov. 1979*
Ellen C. Gunderson and C. Clarine Anderson Nov. 1979 61 p
Submitted for publication
(Contract PHS-NIOSH-210-0123)
(PB80-194574) Avail: NTIS HC A04/MF A01 CSCL 06T

To determine the level of exposure of workers to toxic substances, adequate sampling and analytical methods for the specific substances were provided. Methods for sampling and analyzing 130 abstracts for which no methods were currently available, including gases, vapors, dusts, fumes, and aerosols were developed and validated. GRA

N80-33341 Air Force Hospital, Davis-Monthan AFB, Ariz.
LOSS OF CONSCIOUSNESS IN HIGH PERFORMANCE FIGHTERS (WHAT TO DO ABOUT IT)
Peter R. Nash *In* Society of Experimental Test Pilots Tech. Rev., Vol. 15, No. 1 1980 p 50-52 (For primary document see N80-33337 24-01)
Avail: Issuing Activity

N80-34060# Joint Publications Research Service, Arlington, Va.
CARDIORESPIRATORY SYSTEM REACTIONS OF COSMONAUTS TO EXERCISE FOLLOWING LONG-TERM MISSIONS ABOARD THE SALYUT 6 ORBITAL STATION
A. V. Beregovkin, A. S. Vodolazov, V. S. Georgiyevskiy, L. I. Kokurin, V. V. Kalinichenko, N. V. Korelin, V. M. Mikhaylov, and V. V. Shchigolev *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 9-13 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 8-11 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34061# Joint Publications Research Service, Arlington, Va.
REACTIONS TO LBNP TEST OF THE CREW OF THE SALYUT 6 ORBITAL STATION
V. A. Degtyarev, V. G. Doroshev, Z. A. Kirillova, N. A. Lapshina, S. I. Ponomarev, and V. N. Regozin *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 14-19 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 11-16 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34062# Joint Publications Research Service, Arlington, Va.
PREFLIGHT DISTINCTIONS OF STAPHYLOCOCCUS AURENUS CARRIERS AMONG COSMONAUTS
R. Yu. Tashpulatov, T. N. Nikolayeva, and Ye. V. Guseva *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 29-25 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 16-20 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34071# Joint Publications Research Service, Arlington, Va.
EFFECT OF PERIODIC EXPOSURE TO HEAD-PELVIS ACCELERATIONS ON A SHORT-ARM CENTRIFUGE ON RESPONSES OF THE HUMAN CARDIOVASCULAR SYSTEM
I. F. Vilvilyams *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 70-74 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 48-51 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34072# Joint Publications Research Service, Arlington, Va.
EFFECT OF ANTIORTHOSTATIC HYPOKINESIA AND SPACE FLIGHT FACTORS ON CHANGE IN LEG VOLUME
I. I. Kasyan, V. A. Talavrinov, V. I. Lukyanchikov, and Ye. A. Kobzev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 75-80 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 51-55 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34073# Joint Publications Research Service, Arlington, Va.
SOME OF THE PHYSIOLOGICAL EFFECTS OF 30 DAY BED REST WITH THE BODY IN DIFFERENT POSITIONS
B. S. Katkovskiy, V. S. Georgiyevskiy, G. V. Machinskiy, V. M. Mikhaylov, and Yu. D. Pometov *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep.

1980 p 81-85 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 55-58 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34074# Joint Publications Research Service, Arlington, Va.
CIRCADIAN RHYTHM OF HUMAN BODY TEMPERATURE IN ANTIORTHOSTATIC POSITION
L. Likhagva *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 86-90 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 59-61 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34078# Joint Publications Research Service, Arlington, Va.
EFFECTS OF DIFFERENT HYGIENIC FACTORS ON EXHALATION OF ACETONE BY MAN
V. P. Savina and T. I. Kuznetsova *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 114-117 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 77-80 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N80-34096*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PASSENGER COMFORT TECHNOLOGY FOR SYSTEM DECISION MAKING
D. William Conner Aug. 1980 11 p refs Presented at the Intern. Conf. on Ergonomics and Transportation, Swansea, England, 8-12 Sep. 1980
(NASA-TM-81875) Avail: NTIS HC A02/MF A01 CSCL 05E

Decisions requiring passenger comfort technology were shown to depend on: the relationship between comfort and other factors (e.g., cost, urgency, alternate modes) in traveler acceptance of the systems, serving a selected market require technology to quantify effects of comfort versus offsetting factors in system acceptance. Public predict the maximum percentage of travelers who willingly accept the overall comfort of any trip ride. One or the other of these technology requirements apply to decisions on system design, operation and maintenance. T.M.

N80-34097*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AUTOMATION LITERATURE: A BRIEF REVIEW AND ANALYSIS
Dianne Smith and Duncan L. Dieterly Oct. 1980 17 p refs
(NASA-TM-81245; A-8369) Avail: NTIS HC A02/MF A01 CSCL 05E

Current thought and research positions which may allow for an improved capability to understand the impact of introducing automation to an existing system are established. The orientation was toward the type of studies which may provide some general insight into automation; specifically, the impact of automation in human performance and the resulting system performance. While an extensive number of articles were reviewed, only those that addressed the issue of automation and human performance were selected to be discussed. The literature is organized along two dimensions: time, Pre-1970, Post-1970; and type of approach, Engineering or Behavioral Science. The conclusions reached are not definitive, but do provide the initial stepping stones in an attempt to begin to bridge the concept of automation in a systematic progression. L.F.M.

N80-34098*# Psycho-Linguistic Research Associates, Menlo Park, Calif.
SYNTHESIZED VOICE APPROACH CALLOUTS FOR AIR TRANSPORT OPERATIONS Final Report
Carol A. Simpson Washington NASA Oct. 1980 122 p refs Prepared in cooperation with American Airlines Flight Academy, Fort Worth, Tex.
(NASA Order A-64184-B)
(NASA-CR-3300) Avail: NTIS HC A07/MF A01 CSCL 05I

A flight simulation experiment was performed to determine the effectiveness of synthesized voice approach callouts for air transport operations. Flight deck data was first collected on scheduled air carrier operations to describe existing pilot-not-flying callout procedures in the flight context and to document the types and amounts of other auditory cockpit information during different types of air carrier operations. A flight simulation scenario for a wide-body jet transport airline training simulator was developed in collaboration with a major U.S. air carrier and flown by three-man crews of qualified line pilots as part of their normally scheduled recurrent training. Each crew flew half their approaches using the experimental synthesized voice approach callout system (SYNCALL) and the other half using the company pilot-not-flying approach callout procedures (PNF). Airspeed and sink rate performance was better with the SYNCALL system than with the PNF system for non-precision approaches. For the one-engine approach, for which SYNCALL made inappropriate deviation callouts, airspeed performance was worse with SYNCALL than with PNF. Reliability of normal altitude approach callouts was comparable for PNF on the line and in the simulator and for SYNCALL in the simulator. Author

N80-34099*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF MAGNIFICATION AND VISUAL ACCOMMODATION ON AIMPOINT ESTIMATION IN SIMULATED LANDINGS WITH REAL AND VIRTUAL IMAGE DISPLAYS
Robert J. Randle, Stanley N. Roscoe (New Mexico State Univ., Las Cruces), and John C. Petitt (California Univ., San Diego) Oct. 1980 29 p refs
(NASA-TP-1635; A-8104) Avail: NTIS HC A03/MF A01 CSCL 05I

Twenty professional pilots observed a computer-generated airport scene during simulated autopilot-coupled night landing approaches and at two points (20 sec and 10 sec before touchdown) judged whether the airplane would undershoot or overshoot the aimpoint. Visual accommodation was continuously measured using an automatic infrared optometer. Experimental variables included approach slope angle, display magnification, visual focus demand (using ophthalmic lenses), and presentation of the display as either a real (direct view) or a virtual (collimated) image. Aimpoint judgments shifted predictably with actual approach slope and display magnification. Both pilot judgments and measured accommodation interacted with focus demand with real-image displays but not with virtual-image displays. With either type of display, measured accommodation lagged far behind focus demand and was reliably less responsive to the virtual images. Pilot judgments shifted dramatically from an overwhelming perceived-overshoot bias 20 sec before touchdown to a reliable undershoot bias 10 sec later. Author

N80-34100# California Univ., Los Angeles. Brain Research Inst.
DEVELOPMENT OF NEUROPHYSIOLOGICAL AND BEHAVIORAL METRICS OF HUMAN PERFORMANCE Final Report, 1 Sep. 1978 - 31 Dec. 1979
Samuel L. Moise, Jr. May 1980 153 p refs
(Grant AF-AFOSR-3184-77; AF Proj. 2313)
(AD-A087840; AFAMRL-TR-80-39) Avail: NTIS HC A08/MF A01 CSCL 05/10

A program of research has been conducted to evaluate transient and steady-sate visual evoked response (ER) measures to determine their suitability as metrics for assessing performance (or workload). One of the major drawbacks of the ER is the necessity for creating the response by flashing lights (transient ER) or shifting patterns (steady-state ER) in the subject's visual field. One of the main goals of this program was to explore the production of ERs in ways which do not interfere with task displays or performance. A second major goal was to evaluate the ER as a tool for simultaneous measurement of multiple performance factors. This program produced several research

directions which have important implications for the study of brain function and practical application of the ER as a performance measure. These directions include generation of steady-state activity with visual stimuli above 75 Hz, and the introduction of a concept of temporal tracking by the brain. Among the results of these studies are demonstrations of correlations between the steady-state ER and fatigue and psychological factors. GRA

N80-34068# Joint Publications Research Service, Arlington, Va.
EFFECTS OF TRANSMERIDIONAL FLIGHTS AND HIGHLAND CONDITIONS ON DIFFERENT FORMS OF MEMORY
R. Yu. Ilyuchenok, L. A. Konstantinovskaya, and N. I. Dubrovina *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 54-58 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 38-41 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34069# Joint Publications Research Service, Arlington, Va.
THE ROLE OF FUNCTIONAL ASYMMETRY OF THE CENTRAL NERVOUS SYSTEM IN PILOT PERFORMANCE
A. A. Gyurdzhian and A. G. Fedoruk *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 59-64 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 41-45 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34082# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF CHANGES IN EVOKED BIOELECTRICAL ACTIVITY OF THE BRAIN DURING EXPOSURE TO HIGH-INTENSITY STATIONARY MAGNETIC FIELD
L. D. Klimovskaya *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 132-136 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 88-90 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N80-34101*# Hamilton Standard, Windsor Locks, Conn.
EXTRAVEHICULAR CREWMAN WORK SYSTEM (ECWS) STUDY PROGRAM. VOLUME 1: EXECUTIVE SUMMARY Final Report
R. C. Wilde Jul. 1980 58 p 4 Vol.
(Contract NAS9-15290)
(NASA-CR-163597) Avail: NTIS HC A04/MF A01 CSCL 05H

The Extravehicular Crewman Work System (ECWS) requirements for manned support of space construction and satellite service are defined. Characteristics of structures and satellites are described. Requirements for extravehicular tasks and support equipment are defined. Equipment concepts are presented and evaluated for extravehicular life support, spacesuit, and work aids. Preliminary design of recommended ECWS equipment concepts and new technology developments required for their implementation are discussed. S.F.

N80-34102*# Hamilton Standard, Windsor Locks, Conn.
EXTRAVEHICULAR CREWMAN WORK SYSTEM (ECWS) STUDY PROGRAM. VOLUME 2: CONSTRUCTION Final Report
R. C. Wilde Jul. 1980 392 p refs 4 Vol.
(Contract NAS9-15290)
(NASA-CR-163698) Avail: NTIS HC A17/MF A01 CSCL 05H

The construction portion of the Extravehicular Crewman Work System Study defines the requirements and selects the concepts for the crewman work system required to support the construction of large structures in space. S.F.

N80-34103*# Hamilton Standard, Windsor Locks, Conn.
EXTRAVEHICULAR CREWMAN WORK SYSTEM (ECWS) STUDY PROGRAM. VOLUME 3: SATELLITE SERVICE Final Report
R. C. Wilde Jul. 1980 102 p refs 4 Vol.
(Contract NAS9-15290)
(NASA-CR-163599) Avail: NTIS HC A06/MF A01 CSCL 05H

The satellite service portion of the Extravehicular Crewman Work System Study defines requirements and service equipment concepts for performing satellite service from the space shuttle orbiter. Both normal and contingency orbital satellite service is required. Service oriented satellite design practices are required to provide on orbit satellite service capability for the wide variety of satellites at the subsystem level. Development of additional satellite service equipment is required. The existing space transportation system provides a limited capability for performing satellite service tasks in the shuttle payload bay area. S.F.

N80-34104*# Hamilton Standard, Windsor Locks, Conn.
EXTRAVEHICULAR CREWMAN WORK SYSTEM (ECWS) STUDY PROGRAM. VOLUME 4: PROGRAM EVOLUTION Final Report
R. C. Wilde Jul. 1980 141 p refs 4 Vol.
(Contract NAS9-15290)
(NASA-CR-163600) Avail: NTIS HC A07/MF A01 CSCL 05H

The program evaluation portion of the Extravehicular Crewman Work System Study defines the new technology requirements for equipment to support space construction and satellite service in orbit. S.F.

N80-34105# Federal Aviation Agency, Atlantic City, N.J.
AUTOMATED FLIGHT PLAN FILING BY SIMULATED VOICE RECOGNITION Interim Report, Aug. 1975 - May 1978
Ephraim Shochet and Richard Lemanski Aug. 1980 37 p
(FAA Proj. 131-401-835)
(AD-A089138; FAA-CT-80-15; FAA-RD-80-56) Avail: NTIS HC A03/MF A01 CSCL 05/8

The Systems Research and Development Service (SRDS) asked the Federal Aviation Administration (FAA) Technical Center to develop and demonstrate the capability of automatic flight plan filing by computerized word recognition. To accomplish a prototype capability, it was necessary to begin gathering human factors data to help determine the correct technical approach and design concept. The tests reported herein centered on two questions: Would pilots use this method of flight plan entry? Which of the three protocols simulated do pilots prefer most? Because of the limitations inherent in this experiment, the answers to these questions are tentative at this time. Given the assumption that the actual utterance recognition device (URD) performs at a level comparable to the simulation used in this experiment, it is entirely reasonable to conclude that general aviation pilots would (1) elect to file flight plans by computerized word recognition using a real computer and (2) prefer 'no prompt' or a 'word echo-back prompt' over the 'cue-tone prompt.' The results show that the preferred protocol was the 'no prompt' method. GRA

N80-34059# Joint Publications Research Service, Arlington, Va.
HYGIENE AND TOXICOLOGY OF HUMAN WASTE GASES
V. V. Kustov and L. A. Tiunov *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 1-8 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 3-7 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34070# Joint Publications Research Service, Arlington, Va.
DISTINCTIONS OF PILOT MOTOR ACTIVITY IN DIFFERENT PILOTING MODES DURING LANDING APPROACHES

R. I. Brusnichkina *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 65-69 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 14, 1980 p 45-48 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

N80-34077# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDIES OF SETTING STANDARD FOR OPTIMUM SALT COMPOSITION OF PORTABLE WATER
L. I. Elpiner and O. I. Balashov *In its* USSR Report: Space Biol. and Aerospace Med., Vol. 14, No. 4 (JPRS-76415) 12 Sep. 1980 p 105-113 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 4, 1980 p 71-77 (For primary document see N80-34058 24-51)
Avail: NTIS HC A08/MF A01

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

N80-34106*# National Aeronautics and Space Administration, Washington, D. C.
PUBLICATIONS OF THE EXOBIOLOGY PROGRAM FOR 1979: A SPECIAL BIBLIOGRAPHY
Linda G. Pleasant, comp. and Donald L. DeVincenzi, comp. Oct. 1980 34 p refs
(NASA-TM-82182) Avail: NTIS HC A03/MF A01 CSCL 03B

A list of 1973 publications resulting from research pursued in exobiology is presented. The research was under the auspices of NASA's Exobiology Program. Author

N80-33430*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SETI INSTRUMENT DEVELOPMENT PLAN
R. B. Crow *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 15-22 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

N80-33431*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A BIMODAL SEARCH STRATEGY FOR SETI
S. Gulkis, E. T. Olsen, and J. Tarter (California Univ., Berkeley) *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 23-32 refs (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N80-34107 California Univ., Los Angeles.
PERFORMANCE OF COMPUTERS WITH MULTIACCESS MEMORY Ph.D. Thesis
David Guy Hobbits 1980 192 p
Avail: Univ. Microfilms Order No. 8023319

Multiaccess memory is defined as any fixed access time memory which allows multiple requests to be served concurrently. The maximum number of requests that can be served concurrently is determined by the memory component design and is called the degree of multiaccess. Multiaccess memory is an alternative and a complement to other methods for improving memory bandwidth such as multiple modules, shorter access and cycle times, and longer word length. Presently it is used only in CPU applications. Design suggestions for larger capacity multiaccess memory components suitable for cache and main memory applications. The effect of replacing conventional memory with multiaccess memory is evaluated for several computer architectures. First a cache architecture in which the cache is dedicated to a single CPU. CPU lookahead and block transfer from main memory are the sources of concurrent requests. Simulations show that using either a multimodule or multiaccess cache can significantly show that using either a execution rate of this type of computer. However, multiaccess cache is found to offer little additional performance compared to multimodule memory of equal bandwidth. Apparently cache memory requests tend to be sequentially addressed, causing very little contention in an interleaved cache memory. Dissert. Abstr.

N80-34108 Cornell Univ., Ithaca, N. Y.
SPECIFICATION AND VERIFICATION OF COMMUNICATIONS IN PARALLEL SYSTEMS Ph.D. Thesis
Carl Howard Hauser 1980 111 p
Avail: Univ. Microfilms Order No. 8020828

A verification is theory developed for systems of parallel processes communicating with one another by sending messages. The goal is independent specification of processes in a system so that the system can be verified from the specifications of its component processes. A process is regarded as a generator of a formal language called its communication language. A specification is written as a first order predicate calculus formula about this formal language. Processes are verified by including assertions in them and proving that the assertions hold, much as is done for sequential programs. An important aspect of the work is treatment of nondeterminism and its effect on the termination, nondetermination and deadlock properties of systems and processes. It is argued that nondeterminism should be curtailed if specifications are to accurately reflect the specifier's wishes. Rules relating assertions and statements are similar to those used in Floyd-Hoare logic. However, both partial correctness, sometimes called safety in the literature, and liveness, which is a concept analagous to termination of sequential programs are considered. Justification of liveness assertions takes advantage of statements that occur both before and after the assertion, introducing a new kind of proof rule which is proved correct.
Dissert. Abstr.

N80-34109 California Univ., Los Angeles.
BUILDING BLOCK MODELING METHODOLOGY FOR COMPOSITION OF MICROPROCESSOR-BASED DIGITAL SYSTEMS Ph.D. Thesis
Jeffrey Howard Drobman 1980 607 p
Avail: Univ. Microfilms Order No. 8023297

The SARA (system architect's apprentice) system is an integrated set of computer aided tools supporting a structured methodology for design and analysis of hardware and software in digital systems. The structured methodology supported by SARA concludes top-down design with a bottom-up design step utilizing a library of interconnectable building block models. Methodology for modeling building blocks within the SARA structured, multilevel design environments is discussed. The focus is on microprocessor family type building blocks with intentions to provide methodology applicable to other hardware and software building blocks. An investigation was conducted into the strength and weaknesses of SARA for modeling off-the-shelf hardware integrated circuits. It is extensible to cover chip design using sub-chip BB's, system design using broad-leval BB's, and software system design using software BB's. Dissert. Abstr.

N80-34110 Duke Univ., Durham, N. C.
A SIMULATION FACILITY FOR PERFORMANCE EVALUATION OF SHARED-RESOURCE COMPUTER ARCHITECTURES Ph.D. Thesis
Norman Clark Strole 1980 370 p
Avail: Univ. Microfilms Order No. 8022865

The Duke University Shared-Resource Simulator was designed to be both powerful and flexible and offers the user a wide range of realistic simulation options. The use of simulation models for the analysis of shared-resource computer systems is sometimes the only available means for accurately evaluating system performance when the system is nonexistent or in early stages of development. Special emphasis is placed on the development of a workload generation model which permits the user to automatically synthesize a series of complex task structures for use as input to the simulation program. The Duke University Resource Usage Graph generation facility produces realistic precedence graphs based on statistical data which characterizes the desired workload. The simulation results of concurrent task execution in a shared-resource environment are in very close agreement with those obtained using analytic techniques. A unique application of the central server queueing model is introduced for purposes of cost throughput optimization of a shared resource, multiprocessor system specifically designed for concurrent execution of tasks within a single job. Dissert. Abstr.

N80-34111*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SUMC FAULT TOLERANT COMPUTER SYSTEM
10 Sep. 1980 74 p
(Contract NASA-31747)
(NASA-CR-161581) Avail: NTIS HC A04/MF A01 CSCL 09B

The results of the trade studies are presented. These trades cover: establishing the basic configuration, establishing the CPU/memory configuration, establishing an approach to crosstrapping interfaces, defining the requirements of the redundancy management unit (RMU), establishing a spare plane switching strategy for the fault-tolerant memory (FTM), and identifying the most cost effective way of extending the memory addressing capability beyond the 64 K-bytes (K = 1024) of SUMC-II B. The results of the design are compiled in Contract End Item (CEI) Specification for the NASA Standard Spacecraft Computer II (NSSC-II), IBM 7934507. The implementation of the FTM and memory address expansion. Author

N80-34112# European Space Agency, Paris (France).
CONTRIBUTIONS TO THE SYMPOSIUM: COMPUTER SCIENCE IN SPACE FLIGHT
A. Kurau, ed. Feb. 1980 149 p refs Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 Conf. held at Oberpfaffenhofen, West Germany, 19 Jan. 1978 Original report in GERMAN previously announced as X80-72803
(ESA-TT-587; DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53,50

A process control computer as a component of complex systems, data handling for medical experiments in the space laboratory preprogram ASSESS 2, computer assisted data acquisition for space flight, and the description of a system for the interactive processing of picture data obtained from geostationing weather satellites are presented. Other topics include the application of computer controlled manipulations to underwater technology, the need for operational data handling in accurate satellite tracking, onboard autonomy in satellite control, coupling of IBM and Siemens systems on an RJE basis as implemented in a regional computer center, the use of the OMS - MVS operational system in technical and scientific fields, software and PROINF applications with EBOSIPES, and process control for RIT 10 tests. For individual titles, see N80-34113 through N80-34125.

N80-34113# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. for Avionics and Microwaves.
DIGITAL COMPUTERS AS COMPONENTS OF COMPLEX SYSTEMS
Herwig Oettl *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 1-19 refs Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)
(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53,50

The applications of digital computers to several complex technical systems which include a computer as one of their essential subsystems are described. These systems include VHF telemetry and telecommand stations, a VHF radio interferometer, an S band ground station, a German experimental ship terminal, and an antenna test range. The described systems are to be used in an Institute of Avionics and Microwaves, where high frequency technology is to be combined with computer technology. Author (ESA)

N80-34114# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. for Aviation Medicine.
DATA HANDLING IN THE MEDICAL EXPERIMENT OF THE SPACELAB PREPARATORY PROGRAM ASSESS 2
Reinhold Herrmann *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 20-36 refs Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)
(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53,50

A medical experiment carried out as part of the Spacelab Preparatory Program ASSESS 2 is described. During the course of this experiment the payload specialists were subjected to a series of measurements that continued over a period of eleven days, including rhythm changes in a 24 hour cycle, quality and quantity of sleep, and acute and cumulative stress. A description of the recording, on-line monitoring, and evaluation of these signals is presented. Author (ESA)

N80-34115# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. for Avionics and Microwaves.
COMPUTER-SUPPORTED ACCESS SYSTEMS IN SPACE FLIGHT
Hans-Joachim Katerle *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 37-46 refs Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt" Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)
(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53,50

The remote control of a spacecraft is described as a technical process. The introduction of remote programmable control computers is suggested as a means of improving the control process and a short description is given of the present state of work in connection with remote programming. The continuation of the work calls for the setting up of a Center for Computer Science and the development of a data management concept for space missions. Author (ESA)

N80-34116# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). German Space Operations Center.
DESCRIPTION OF A SYSTEM FOR THE INTERACTIVE PROCESSING OF THE IMAGE DATA OF A GEOSTATIONARY WEATHER SATELLITE
Joerg Gredel, Willi Rattei, and Ulrich Schwarz *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 47-58 refs Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)
(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53,50

An overall view of the hardware and software designed for processing Meteosat image data is presented. The system includes a color display system with video disc storage, controlled by a

digital computer MULBY 3/35 which also transmits the data to the main computer installation AMDAHL 470 V/6. The McIDAS program (man computer interactive data access system) allows interactive processing from the point of view of meteorological users. Author (ESA)

N80-34117# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. for the Dynamics of Flight Systems.

THE USE OF COMPUTER-CONTROLLED MANIPULATORS IN UNDERWATER TECHNOLOGY

Lothar Schmeider *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 59-72 refs Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)

(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53.50

Possible applications of manipulators in underwater technology, and particularly in off-shore oil drilling, are reviewed. Reference is made to an underwater laboratory able to dive to depths of up to 100 m, and work being done for extending the diving depth to 600 m. A computer controlled external manipulator for more flexible and effective operation is discussed. Author (ESA)

N80-34118# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. for the Dynamics of Flight Systems.

OPERATIONAL DATA HANDLING: AN ESSENTIAL NEED FOR THE ACCURATE DETERMINATION OF SATELLITE ORBITS

Klaus Zimmermann *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 73-87 refs Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt" Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)

(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53.50

The problem of accurate satellite orbit determination caused by refraction error is analyzed by means of a practical example. Comparison between available methods and theoretical analysis shows that orbit determination using the unbiased minimum variance principle offers the best performance. The method consists of: modeling the satellite dynamics with a computer, converting the position and the velocity into the measured variables, and then varying the orbit until the difference betweem measurement and calculation becomes minimum. Author (ESA)

N80-34119# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. for the Dynamics of Flight Systems.

PROBLEMS OF AUTONOMOUS AIRBORNE SATELLITE CONTROL SYSTEMS

Gerhard Hirzinger *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 88-94 refs Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)

(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53.50

The advantages and technical feasibility of autonomous satellite-borne controls are examined. In particular the performance of such operations as orbit determination, orbit control, attitude determination, and attitude control is discussed. It is concluded that it is an objective capable of realization with the help of microcomputers. Author (ESA)

N80-34120# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).

COUPLING OF IBM AND SIEMENS SYSTEMS ON RJE-BASIS AS IMPLEMENTED IN REGIONAL COMPUTER CENTER FOR THE MANNHEIM AND HEIDELBERG UNIVERSITIES

Harish C. Saxena *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 95-105 refs Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)

(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53.50

Some of the hardware and software features of the system connecting an IBM OS/MVS computer with a Siemens BS 2000 computer are presented. The description includes the required functions of the combined system, the hardware connections, the software changes required, the interface program to facilitate the user's communication with the coupled system, the coupler program which is the main part of the system, and the telecommunications program for buffering the incoming and outgoing messages. The logic flow is also described. Author (ESA)

N80-34121# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Computer Center.

USE OF THE OPERATING SYSTEM OS-MVS IN THE TECHNICAL AND SCIENTIFIC FIELD

Johannes Gersing *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 106-113 Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)

(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53.50

The characteristics of the multiple virtual storage (MVS) concept in multiprogramming with computers such as the IBM 370 series are described. The most important properties of the MVS system are pointed out, such as the assigning to each user of his own virtual adress space, the dynamic job mix by means of swapping strategies, and the security of the MVS operating system (system integrity). Author (ESA)

N80-34122# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).

EXPERIMENTAL WORK PLACE FOR THE EBOSIPES RESEARCH PROJECT

Karel Dobes *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 114-123 refs Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)

(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53.50

The hardware implementation of the EBOSIPES project is presented. The EBOSIPES is a computer system intended to elaborate user oriented software modules in PEARL language for experimenters in Spacelab. The discussion includes: the configuration of the computer unit (Siemens (404/3); the development of the peripheral equipment consisting of two disc stores, an image terminal, and a matrix printer; the development of the process software and system support software and the interfaces to the user which consist of the PEARL real time language, the remote acquisition unit, and a full scale model of the Spacelab module. Author (ESA)

N80-34123# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).

SOFTWARE FOR EBOSIPES: PRESENT STATE AND TRENDS

Gottfried Schwarz *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 124-128 Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)

(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53.50

The EBOSIPES is a computer system intended to elaborate user oriented software modules for experimenters in Spacelab. An analysis of the criteria that should be complied with by the system software is presented. The higher level real time language

PEARL satisfies the requirements. Pre-programmed modules in PEARL language were prepared for selected experiments to identify data handling problems. The development trends for the EBOSIPES project are also discussed. Author (ESA)

N80-34124# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. for Communication Engineering
THE USE OF PROINF IN THE RESEARCH PROJECT EBOSIPES
Peter Unger *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 129-130 Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)
(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53.50

The project information system PROINF has a modular structure and is used interactively in the research project EBOSIPES. The system makes it possible to obtain an immediate overall view of project relevant data such as costs incurred, working time employed, and project progress. The constituent modules of PROINF are described. Author (ESA)

N80-34125# Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. for Applied Physics.
EMPLOYMENT OF A DIGITAL COMPUTER IN THE TESTS TO ASCERTAIN THE USEFUL LIFE OF THE THRUSTER RIT 10
Manfred Savary *In* ESA Contrib. to the Symp.: Computer Sci. in Space Flight (ESA-TT-587) Feb. 1980 p 131-144 Transl. into ENGLISH of "Beitraege zum Symp.: Datentechnik in der Raumfahrt", Rept. DFVLR-Mitt-78-02 DFVLR, Oberpfaffenhofen, West Germany, Oct. 1978 (For primary document see N80-34112 24-60)
(DFVLR-Mitt-78-02) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 53.50

The data acquisition and data processing for a test stand of mercury ion thrusters using a Honeywell H716 computer are described. The RIT 10 ion thrusters are being developed for use in satellite attitude control systems. A special vacuum chamber was developed for the test. Test results show over 8000 hrs life in continuous operation and much shorter life in cycled operation. Examples of data formats are presented Author (ESA)

N80-34126# National Technical Information Service, Springfield, Va.
MICROCOMPUTERS: TELECOMMUNICATION APPLICATIONS. CITATIONS FROM THE NTIS DATA BASE Progress Report, Mar. 1976 - Jun. 1979
William E. Reed Jul. 1980 266 p Supersedes NTIS/PS-79/0728; NTIS/PS-78/0613
(PB80-812688; NTIS/PS-79/0728; NTIS/PS-78/0613) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

The bibliography of worldwide research literature cites studies on telecommunication applications of microcomputers. Telephone, data transmission, teleprinters, facsimile communication, and communications controllers are among the applications cited. This updated bibliography contains 260 abstracts, none of which are new entries to the previous edition. GRA

N80-34127# National Technical Information Service, Springfield, Va.
MICROCOMPUTERS: TELECOMMUNICATION APPLICATIONS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, Jul. 1979 - Jun. 1980
William E. Reed Jul. 1980 196 p Supersedes NTIS/PS-79/0728; NTIS/PS-78/0613
(PB80-812696; NTIS/PS-79/0728; NTIS/PS-78/0613) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

The bibliography of worldwide research literature cites studies on telecommunication applications of microcomputers. Telephone, data transmission, teleprinters, facsimile communication, and communications controllers are among the applications cited. This updated bibliography contains 191 abstracts, all of which are new enteries to the previous edition. GRA

N80-34128# National Technical Information Service, Springfield, Va.
MICROCOMPUTERS: GENERAL APPLICATIONS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1978 - May 1979
Brian Carrigan Jun. 1980 188 p Supersedes NTIS/PS-79/0725; NTIS/PS-78/0609
(PB80-812597; NTIS/PS-79/0725; NTIS/PS-78/0609) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

This bibliography of Federally funded research cities studies on the applications of minicomputers. These include process control, testing, navigation, instrumentation, biomedicine, machining, training, as well as other applications. This updated bibliography contains 181 abstracts, none of which are new entries to the previous edition. GRA

N80-34129# National Technical Information Service, Springfield, Va.
MICROCOMPUTERS: GENERAL APPLICATIONS. CITATIONS FROM THE NTIS DATA BASE Progress Report, Jun. 1979 - May 1980
Brian Carrigan Jun. 1980 165 p Supersedes NTIS/PS-79/0725; NTIS/PS-78/0609
(PB80-812605; NTIS/PS-79/0725; NTIS/PS-78/0609) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

This bibliography of Federally funded research cites studies on the applications of minicomputers. These include process control, testing, navigation, instrumentation, biomedicine, machining, training, as well as other applications. This updated bibliography contains 158 abstracts. GRA

N80-34130# National Technical Information Service, Springfield, Va.
MICROCOMPUTERS: DESIGN AND SOFTWARE DEVELOPMENT. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - 1978
Brian Carrigan Jul. 1980 219 p Supersedes NTIS/PS-79/0723; NTIS/PS-78/0610
(PB80-812613; NTIS/PS-79/0723; NTIS/PS-78/0610) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

The design of microcomputers and the development of its software are covered in this bibliography of Federally funded research. Studies on microcomputer applications are included only if the above topics are cited. Circuit and chip technology, and performance evaluation are included. This updated bibliography contains 213 abstracts, none of which are new entries to the previous edition. GRA

N80-34131# National Technical Information Service, Springfield, Va.
MICROCOMPUTERS: DESIGN AND SOFTWARE DEVELOPMENT. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1979 - May 1980
Brian Carrigan Jul. 1980 90 p Supersedes NTIS/PS-79/0723; NTIS/PS-78/0610
(PB80-812621; NTIS/PS-79/0725; NTIS/PS-78/0610) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

The design of microcomputers and the development of its software are covered in this bibliography of Federally funded research. Studies on microcomputers applications are included only if the above topics are cited. Circuit and chip technology, reliability, and performance evaluation are included. This updated bibliography contains 83 abstracts, 62 of which are new entries to the previous edition. GRA

N80-34132# National Technical Information Service, Springfield, Va.
MICROCOMPUTERS: GENERAL APPLICATIONS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1978 - May 1980
Brian Carrigan Jul. 1980 146 p Supersedes NTIS/PS-79/0727; NTIS/PS-78/0612
(PB80-812639; NTIS/PS-79/0727; NTIS/PS-78/0612) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

The bibliography of worldwide research literature cites studies on the applications of microcomputers. These include automotive, testing, navigation, instrumentation, biomedical, machine tools, and other applications. This updated bibliography contains

139 abstracts, 42 of which are new entries to the previous edition. GRA

N80-34133# National Technical Information Service, Springfield, Va.
MICROCOMPUTERS: BASIC DESIGN AND DEVELOPMENT. CITATIONS FROM THE NTIS DATA BASE Progress Report, Jul. 1979 - May 1980
Brian Carrigan Jul. 1980 190 p Supersedes NTIS/PS-79/0730; NTIS/PS-78/0615
(PB80-812654; NTIS/PS-79/0730; NTIS/PS-78/0615) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

The bibliography of worldwide research literature cites studies on the design and development of microcomputers. Studies on software development, chip development, LSI technology, and reliability and performance evaluation testing are included. This updated bibliography contains 183 abstracts, all of which are new entries to the previous edition. GRA

N80-34134# Federal Compiler Testing Center, Washington, D.C.
TANDEM 16, COBOL -T9201D00 Validation Summary Report
13 Jun. 1980 53 p
(PB80-190283; CCVS74-VSR600) Avail: NTIS HC A04/MF A01 CSCL 09B

A consolidated summary of the results obtained from the validation of the TANDEM/16 T9201 COBOL compiler version D00 against the 1974 COBOL Standard is presented. An overview of the validation which lists all categories of discrepancies by level/module; a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed are included. GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N80-34135 British Library Lending Div., Boston Spa (England).
IDENTIFICATION OF A NONLINEAR SYSTEM BY MEANS OF THE MODIFIED GMDH
A. Endo [1978] 10 p refs Transl. into ENGLISH from Soc. Instr. Control (Tokyo), no. 14, 1978 p 130-135
(BLL-Trans-1446) Avail: British Library Lending Div., Boston Spa, England

Application of the group method of data handling is discussed for the identification of a nonlinear system whose mathematical relationships are known, and the scrutinization and examination of the method itself through simulations. Unnecessary increases in degree and in the stability were observed. A method of improvement is proposed. By means of the modified CMDH a nonlinear model was obtained which corresponded to the input/output characteristics, was practical and had an appropriate degree of accuracy, and also exhibited improved convergence of the identification process, model stability and faithfulness. The advantages of the GMDH as a method of analysis for systems with few data and operational systems are as before, but prospects can be seen for the modified GMDH as a practical identificational method for nonlinear systems in engineering. The combination might be considered with other existing methods of identification of the nonlinear general degree prediction hypothesis. In learning machines, too, a method of treatment is being considered of the whole pattern by means of the overlapping of such local treatments, which is more effective than the perceptron type. S.F.

N80-34136 Texas Univ. at Austin.
DETERMINING THE THREE-DIMENSIONAL MOTION AND MODEL OF OBJECTS FROM A SEQUENCE OF IMAGES Ph.D. Thesis
John Wilson Roach 1980 159 p
Avail: Univ. Microfilms Order No. 8021507

An attempt is made to determine precisely how an object is moving in three dimensional space and to determine the three dimensional relationship of points on the surface of the object. The only information available is a sequence of photographic images taken as the object moves across the field of view. The mathematical analysis of the problem shows that there is an infinite number of geometrically similar solutions, each solution differing from the others by a scaling factor. A specific solution can be found by setting the scaling factor to an arbitrary number. Two views of six feature points or three views of four feature points are required to find the model and movement. For good accuracy, however, considerably more points, two views of twelve or fifteen points, for example, are needed. Dissert. Abstr.

N80-34137 Texas A&M Univ., College Station.
A LANGUAGE FOR DESIGNING SOFTWARE SYSTEMS Ph.D. Thesis
Dick B. Simmons 1980 140 p
Avail: Univ. Microfilms Order No. 8023061

A prototype of a new design system was implemented. This implementation includes: (1) a design language for expressure design information; (2) a data base for holding design information; (3) a set of feedback and analysis tools; and (4) a command language for manipulating the feedback and analysis tools. The design language is a relational language. Objects are defined in the language and then relationships are established between objects. Feedback and analysis tools were developed with the intent of making the information feedback loop shorter. Dissert. Abstr.

N80-34138 Ohio State Univ., Columbus.
THE RECOGNITION OF STRAIGHT LINE PATTERNS BY BUS AUTOMATIONS USING PARALLEL PROCESSING Ph.D. Thesis
John Rolf Melby 1980 125 p
Avail: Univ. Microfilms Order No. 8022312

Highly parallel computers are capable of solving some problems much more rapidly than sequential computers. Algorithms are presented on the Bus Automaton, a parallel computer. The Bus Automaton solves various computation problems immediately, i.e., in O(1) time, while they would take from O(1) to O(n squared) time on sequential computers. The primary immediate computation is the recognition of straight lines. Other problems also immediately computed are: mass transformation of data sets, arithmetic in stroke or binary notation, computation of statistical mean and variance, lexicographic sorting, and general arithmetic expression computation. Dissert. Abstr.

N80-34139 California Univ., Los Angeles.
A FORMAL PROGRAM MODEL FOR DISCRETE EVENT SIMULATION AND ITS USE IN THE VERIFICATION AND VALIDATION OF SYSTEM MODELS AND IMPLEMENTATIONS Ph.D. Thesis
Melvin M. Cutler 1980 248 p
Avail: Univ. Microfilms Order No. 8023293

Techniques are introduced to verify formalized simulation programs against sequential machine specifications by relating the program to a structural description of the system to be simulated. It is shown that discrete event specifications, popular vehicles for system description, are realizable by the usual discrete time system formalism of automata theory. A discrete event simulation of a discrete deterministic system is shown to be a formal object whose fidelity to the system can be proved. This is effected by constructing a homomorphism from an operational model of the discrete event simulation to the discrete event specification restricted to a countable time line. A discrete event simulation of a discrete stochastic system is shown to be a formal object whose statistical fidelity to the system can be proved. This is effected by the construction of a covering homomorphism whose domain is the associated stochastic sequential machine of the ergodic machine characterizing the discrete event simulation program and whose range is a stochastic discrete event specification, the discrete event version of stochastic sequential discrete event specification, the discrete event version of stochastic sequential machines. Dissert. Abstr.

N80-34140 Colorado Univ. at Boulder.
AN ANALYSIS OF PASCAL PROGRAMS AND SEVERAL BASIC BLOCK OPTIMIZATIONS Ph.D. Thesis
Lynn Robert Carter 1980 282 p

Avail: Univ. Microfilms Order No. 8021556

Eighty nine Pascal programs are examined and many of the static properties of these programs are characterized. Additionally, an analysis of several basic block optimizations is performed. The results are: first, nearly all common subexpressions deal with addressing; second, subscripts tend to be very simple; and lastly, that the use of increment and decrement instructions will replace a significant number of additions, subtractions, and stores. Dissert. Abstr.

N80-34141 Southern Methodist Univ., Dallas, Tex.
THEORY AND DESIGN OF UNIDIRECTIONAL ERROR CODES Ph.D. Thesis
Bella Bose 1980 125 p
Avail: Univ. Microfilms Order No. 8023444

By defining a parameter N(X,Y) the capabilities of binary block codes for unidirectional error correction/detection are established. Block codes, called SEC-MUED codes, which are capable of correcting single errors and detecting multiple unidirectional errors are given. Encoding/decoding algorithms for these nonsystematic codes are also given. Some bounds for the number of code words in a SEC-MUED code are discussed. A coding technique for correcting unidirectional errors in a shift register memory or in a magnetic tape unit is devised. This coding scheme corrects any pattern of unidirectional errors confined to a single track. The information rate of these codes is better than the known CRC codes. Further properties of these codes are also discussed. A method to design systematic SEC-MUED code is discussed. The unidirectional error correcting/detecting capabilities of some of the known symmetric error correcting codes are discussed. Dissert. Abstr.

N80-34142 Cornell Univ., Ithaca, N. Y.
THE SIZE OF NUMBERS IN THE ANALYSIS OF CERTAIN ALGORITHMS Ph.D. Thesis
Ravindran Kannan 1980 96 p
Avail: Univ. Microfilms Order No. 8020841

In the case of the LUP decomposition algorithm for solving simultaneous equations and the Euclidean algorithm to find the greatest common divisor of two polynomials, prima facie cases for the size of the numbers (number of binary digits required to represent the numbers) produced by these algorithms not to be polynomially bounded in the length of the input are presented. Unimodular triangularization, (computation of the Hermite and Smith normal forms of an integer matrix), are studied. Known algorithms for these problems are proved to be polynomially time bounded only under the assumption that all intermediate numbers produced by these algorithms were polynomial size bounded. The number of arithmetic operations performed by these algorithms depends upon the size of the numbers computed. Aggregation, a technique used to produce one linear Diophantine equation in nonnegative variables that has the same set of solutions as a given system of simultaneous linear Diophantine equations in nonnegative variables, can be done by a good algorithm. Dissert. Abstr.

N80-34143 Carnegie-Mellon Univ., Pittsburgh, Pa.
FORWARD LINEAR PROGRAMMING Ph.D. Thesis
Jay Ellis Aronson 1980 219 p
Avail: Univ. Microfilms Order No. 8021189

A forward algorithm is developed of solving and finding planning horizons for the infinite horizon version of the deterministic production smoothing problem without inventory. This model approximates the real world situation for highly obsolescent or perishable commodities such as newspapers and fresh produce. Computational results show that the algorithm is linear in problem length, while linear programming is at least quadratic. This model is investigated by control theory and linear programming. Planning horizons or heuristic planning horizons are identified in the simplex tableau. These horizons yield techniques which improve the efficiency of the simplex method. A simple version of a forward linear programming algorithm for the specially structured problem is developed and encouraging computational results are preserved. The development, implementation and testing of the Forward Simplex Method, a procedure for solving general dynamic linear programs is discussed. Detailed computational results of the algorithm tested on three models are presented. The first model is the production smoothing problem without inventory. The second model is similar to the first, with the addition of inventory. The third is a manpower planning model. Tests suggest that solution time is linear in the problem length, versus quadratic or cubic for earlier linear programming codes. Dissert. Abstr.

N80-34144 Ohio State Univ., Columbus.
AUTOMATIC FLOWSHEET DRAWING FOR THE COMPUTER AIDED DESIGN OF CHEMICAL PROCESSES USING INTERACTIVE COMPUTER GRAPHICS Ph.D. Thesis
Peter Evans Steacy 1980 252 p
Avail: Univ. Microfilms Order No. 8022350

A proposal in made for system for the computer aided design of chemical processes. Distinguishing this system would be its orientation toward fast, effective, interaction between the engineer and the computer. To be effective, the proposed system must be able to automatically (and artistically) layout and draw a flowsheet given the process units and their interconnections. The problem was formalized and algorithms were developed for its solution. The basic requirement set for the flowsheet is that it be drawn in a planar fashion (without stream crossings). This is achieved by modeling flowsheet with an abstract graph, deriving information about a planar representation for that graph, and using the information gained to construct a planar flowsheet. A prototype system is built to demonstrate the feasibility of using automatic flowsheet drawing in computer aided design system. Dissert. Abstr.

N80-34145 Texas Univ. at Austin.
A GRAPH THEORY APPROACH TO SOFTWARE EVALUATION Ph.D. Thesis
James Ching-Chiou Hsu 1980 136 p
Avail: Univ. Microfilms Order No. 8021449

The roles of specification and program complexity in the software life cycle are explored and methods for the design and analysis of programs that incorporate the realiability aspects are developed. One specific objective is to develop a procedure so that a system specification, which is modeled by a decision table, can be checked for its completeness and correctness. A logical dependency graph is used to model the logical dependence relationships among conditions. The logical dependency graph is proved to be an acyclic diagraph. A procedure is developed so that all the feasible logical possibilities can be found. A concomitant procedure is also developed to check for the completeness and correctness of a decison table. The two procedures will aid the system analyst performing the validation of system modeling. Another objective is to develop a quantitative measure that can used to measure the complexity of programs. A structural graph model is developed. The minimal cut-set of a structural graph is calculated and used to measure program complexity. This measure can then applied to the analyses of computer programs in terms of complexity and clarity. Such an analysis indicates where the deep nesting and the unrestrained flow of control occur. Dissert. Abstr.

N80-34146*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
USERS' GUIDE FOR THE TABULAR DISPLAY REPORT GENERATOR PROGRAM (TABDIS)
Dennis M. Braley Aug. 1980 60 p Supersedes JSC-11318; IN-76-FM-38
(NASA-TM-82211; JSC-16792; IN-80-FM-46; JSC-11318; IN-76-FM-38) Avail: NTIS HC A04/MF A01 CSCL 09B

The tabular display report generator (TABDIS) program is described. The program functions as a document generation tool that provides tabular displays of data stored on a data file which has been generated by a user program. The main features of the program are outlined and all necessary inputs are detailed. M.G.

N80-34147# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
A COMPREHENSIVE MODEL FOR HUMAN MOTION SIMULATIONS AND ITS APPLICATION TO THE TAKE-OFF PHASE OF THE LONG JUMP
H. Hatze Dec. 1979 25 p refs
(CSIR-TWISK-131) Avail: NTIS HC A02/MF A01

A mathematical model is presented which makes it possible

to simulate complex motions of a 17 segment hominoid. The dynamical equations are given in compact form and the treatment of external constraints and impact situations are discussed in depth. The present model fully accounts for the dynamics of the executor subsystem and also simulates the intricately controlled internal excitation and contraction dynamics of the myoactuator subsystem. The controls in the model are the actual neural controls motor unit recruitment and stimulation rate, for each of the 46 muscles of the model. For a given set of subject specific input parameters, a given initial state, and given neural control functions, the computer program executing the model computes the state trajectory, the histories of all constraint forces, the trajectory of the center of mass, and the histories of the components of the velocity of the center of mass, of the total angular momentum, of all muscle and joint reaction forces, and of the energies of all 17 model segments. E.D.K.

N80-34148# Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.

REAL-TIME TELEPHONE TRAFFIC SIMULATION USING LEARNING AUTOMATA ROUTING

Philip Mars and Michael S. Chrystall Nov. 1979 37 p refs (S/IS-7909) Avail: NTIS HC A03/MF A01

Telephone traffic routing in more complex hierarchical and generalized networks is considered using both alternate or fixed rule and Linear Reward-Inaction automaton routing. The simulation studies using a microprocessor based real-time simulator are shown to provide confirmation that the automaton routing scheme performs at least as well as the optimal fixed rule. In addition, studies under failure node conditions, including link, node, and focussed overloads, conclusively demonstrate the superior performance of learning automata routing. L.F.M.

N80-34149# Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.

SIMULATION STUDY OF TELEPHONE TRAFFIC ROUTING USING LEARNING ALGORITHMS, PART 2

Kumpati S. Narendra, Philip Mars, and Michael S. Chrystall Oct. 1979 25 p refs

(S/IS-7907-Pt-2) Avail: NTIS HC A02/MF A01

Recent theoretical work indicated that Linear Reward-Penalty automation schemes may also be attractive for applications involving telephone traffic routing. Telephone traffic routing in simple networks with Fixed Rule (currently in use in the real system), Linear Reward-Inaction automaton, and Linear Reward-Penalty automaton routing schemes are compared. The simulation results are shown to provide definite confirmation of previous theoretical predictions concerning the behavior of Linear Reward-Inaction and Linear Reward-Penalty automata in nonautonomous environments. In addition, by a controlled sequence of identification experiments a mathematical model of the simple telephone network/automaton system is formulated. his model permits the theoretical prediction of optimum network blocking probability. L.F.M.

N80-34150# Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.

LEARNING ALGORITHMS FOR TWO PERSON ZERO-SUM STOCHASTIC GAMES WITH INCOMPLETE INFORMATION: A UNIFIED APPROACH

S. Lakshmivarahan (Oklahoma Univ., Norman) and K. S. Narendra Oct. 1979 24 p refs Sponsored in part by NSF

(S/IS-7908) Avail: NTIS HC A02/MF A01

The two person zero-sum game is considered in which either player does not know the set of strategies available to the other player and the mixed strategy used by the other player nor its pure realization at any stage. The outcome of the game depends on chance and the game is played sequentially. The distribution of the random outcome as a function of the pair of pure strategies chosen by either player is also unknown to them. It is shown that if the player uses a learning algorithms of the reward - penalty by proper choice of certain parameters in the algorithms, the expected value of the mixed strategies for both players can be made as close to optimal strategies as desired. A.R.H.

N80-34151*# Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.

APPLICATION OF A HIERARCHICAL STRUCTURE STOCHASTIC LEARNING AUTOMATION

R. G. Neville, M. S. Chrystall, and P. Mars Sep. 1979 49 p refs Sponsored by J. K. Science Research Council

(S/IS-7906) Avail: NTIS HC A03/MF A01

A hierarchical structure automaton was developed using a two state stochastic learning automata (SLA) in a time shared model. Application of the hierarchical SLA to systems with multidimensional, multimodal performance criteria is described. Results of experiments performed with the hierarchical SLA using a performance index with a superimposed noise component of ± or - delta distributed uniformly over the surface are discussed. J.M.S.

N80-34152# Pattern Analysis and Recognition Corp., Rome, N. Y.

IMAGE FEATURE MANUSCRIPT GENERATION Final Technical Report

Michael J. Zoracki, David A. Marks, and James L. Cambier May 1980 164 p

(Contract F30602-78-C-0017; AF Proj. 4594)

(AD-A088884; PAR-80-25; RADC-TR-80-176) Avail: NTIS HC A08/MF A01 CSCL 09/2

This report describes the Image Feature Manuscript Generation capability developed under RADC Contract F30602-78-C-0017. The capability developed here will serve as an experimental facility on which to evaluate advanced techniques of potential application to the Automatic Feature Extraction System (AFES). This effort has been directed at providing an improved interactive means of classifying photographic imagery and for addressing and displaying graphics for the purpose of automatically categorizing image features, generating feature boundaries, and editing the shapes and locations of those boundaries. Specific attention was given to the development of a region growing capability and to the inclusion of an AFAL-developed atmospheric model. These items are described at length within this report. GRA

N80-34153# Control Data Corp., Minneapolis, Minn. Image Systems Div.

MAPS IMAGE COMPRESSION Final Technical Report, 13 Sep. 1978 - 18 Jan. 1980

Anton E. LaBonte and Tom E. Rosenthal May 1980 115 p

(Contract F30602-78-C-0253; AF Proj. 4594)

(AD-A088763; ISD-78003-80-R-1; RADC-TR-80-173) Avail: NTIS HC A06/MF A01 CSCL 05/8

This report encompasses several areas of technique refinement regarding the MAPS image compression technique which were identified in an earlier RADC final technical report, RADC-TR-77-405 dated December 1977 (A050679). These areas incude: adaptive decompression, contrast control simplification, resolution code error detection and recovery, and interactive Macro-fidelity control. GRA

N80-34154# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.

ON THE CONVERGENCE OF A BLOCK SUCCESSIVE OVERRELAXATION METHOD FOR A CLASS OF LINEAR COMPLEMENTARITY PROBLEMS

R. W. Cottle and J. S. Pang Jul. 1980 27 p refs Prepared in cooperation with Stanford Univ., Calif.

(Contracts N00014-75-C-0621; N00014-75-C-0267; DE-AC03-76SF-00326; DE-AT03-76ER-72018; Grant NSF ECS-79-26320; NR Proj. 047-048)

(AD-A088760; MSRR-462; SU-SOL-80-17) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper develops a reduced block successive overrelaxation method for solving a class of (large-scale) linear complementarity problems. The main new feature of the method is that it contains certain reduction operations at each iteration. Such reductions are needed in order to ensure the boundedness (and therefore the existence of accumulation points) of the sequence of iterates produced by the algorithm. Convergence of the method is established by using a theorem due to Zangwill. GRA

N80-34155# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Communication and Humanities.

RESPONSIVENESS AND CONFIGURATION CONTROL FOR

EMBEDDED COMPUTER SOFTWARE M.S. Thesis
Gerald O. Wade Jun. 1980 179 p refs
(AD-A088723; AFIT-LSSR-39-80) Avail: NTIS HC A09/MF A01 CSCL 09/2

The purpose of this research effort was to (1) determine those factors contributing to the inability of the Air Force Logistics Command (AFLC) to provide responsive support to Embedded Computer Software users which has the appropriate degree of control exercised and (2) determine the management systems structure and factors required to provide responsive support of controlled software. The research has three phases. The first is a discussion of software management principles essential to effective software management. The second is comprised of models of three distinct management systems and analyses of each in terms of benefits, deficiencies, operating policy, application of software management principles, and provides comparative conclusions on which aspects of a management system were the best. The third is an analysis of the results of the interaction of the software management principles of relative importance to a management system processing stage. Conclusions developed were that responsiveness problems experienced in AFLC were attributable to its utilization of change blocking, the G026 management system, and its management system's structure. Recommendations were that ECS requirements should take priority, minimal management layering should exist, and explicit responsibility and authority delineation is defined. GRA

N80-34156# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
A COMPILATION OF COMPUTER SOFTWARE PROGRAMS AVAILABLE IN THE FLIGHT DYNAMICS LABORATORY, 1979 Final Report
James L. Terry Dec. 1979 241 p
(AF Proj. 9991)
(AD-A088854; AFFDL-TR-79-3155) Avail: NTIS HC A11/MF A01 CSCL 01/3

A compilation of computer programs useful in the analysis and design of aerospace vehicles is presented. Technical areas covered include: aerodynamics; flight control; vehicle dynamics; crew escape; vehicle structures; vehicle subsystems (i.e., landing gear); preliminary design and analysis; mathematical aids to analysis. This report supersedes Air Force Flight Dynamics Laboratory Technical Report AFFDL-TR-74-26, 'A Library of Computer Programs in Flight Vehicle Technology, 1973.' GRA

N80-33443*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DSN SYSTEM PERFORMANCE TEST SOFTWARE
F. B. Leppla *In its* The Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 121-125 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks.

N80-34157 Oregon State Univ., Corvallis.
IDENTIFICATION AND ANALYSIS OF SIMPLE MODELS FOR THE RESPONSE TIME OF COMPLEX COMPUTER SYSTEMS Ph.D. Thesis
Reza Maneshi 1980 269 p
Avail: Univ. Microfilms Order No. 8021941

A simple approach to developing approximate analytical performance models for complex systems is presented. The approach is applicable in cases where measurement or simulation data describing system performance are available but the system is to complex for exact analytical models to be quickly developed. Known results from queueing theory are first used to indicate the appropraite functional form of analytical formulas for performance, then modified regression techniques are used to estimate unknown parameters, in these formulas. In all cases this simple approach has closely predicted the performance of the system studied. It valuable when it is combined with further analysis of the system to analytically explain the parameters obtained by regression. Dissert. Abstr.

N80-34158 Texas Univ. at Austin.
STOCHASTIC NETWORK WITH RECOURSE Ph.D. Thesis
Hsing-Wei Chu 1980 146 p
Avail: Univ. Microfilms Order No. 8021414

In a stochastic network with recourse problem the external flows are drawn from a finite set with known probabilities. This problem can be formulated as a specical case of a two stage linear programming problem. Here the matrix of structural coefficients represents a network instead of a general linear program. A method which utilizes the special properties of the network and combines the partitioning and subgradient techniques is developed to solve the stochastic network with recourse problem. The method iteractively changes the flows, bases, corresponding dual variables and the gradient vector until the gradient vector indicates that the optimal solution is found. Cycling problems cannor occur in this method sizes of problems are tested. Dissert. Abstr.

N80-34159# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
FLOW CONTROL AND ROUTING ALGORITHMS FOR DATA NETWORKS
Robert G. Gallager and Seyyed J. Golestaani Jul. 1980 10 p refs Presented at the ICCC 1980, Atlanta, 27-30 Oct. 1980 (Contract N00014-75-C-1183; Grant NSF ECS-79-19880; ARPA Order 345; NR Proj. 049-383)
(AD-A088767; LIDS-P-1013) Avail: NTIS HC A02/MF A01 CSCL 09/2

We consider flow control algorithms consisting of two parts: quasi-static flow control and dynamic flow control. The quasi-static part uses short term average information on network utilization to allocate maximum data rates and to determine routes for each user. The rates are allocated to achieve an optimal trade-off between assigned priority cost functions for each user and the cost of congestion in the network. This optimization can be done by a distributed algorithm and is essentially no more complicated than optimizing routing alone. The dynamic flow control has the function of admitting or rejecting individual units of traffic into the network so as to enforce the maximum allocated rates and to prevent congestion by smoothing out the fluctuations in buffer occupancy. GRA

N80-34160# Harris Corp., Melbourne, Fla. Government Communications Systems Div.
MULTIPLE MICROPROCESSOR SYSTEM (MMS) DESIGN STUDY, VOLUME 2 Final Technical Report
Griffiss AFB, N.Y. RADC Mar. 1980 362 p refs 4 Vol.
(Contract F30602-78-C-0114)
(AD-A086066; RADC-TR-80-33-Vol-2) Avail: NTIS HC A16/MF A01 CSCL 09/2

The functional components of MMS are reviewed and those areas where software is needed or where software interfaces are defined. MMS consists of a network of up to 64 microprocessors linked to a minicomputer called the FCP (facility control processor). Several computers are evaluated relative to the needs of MMS. Functionally, the FCP stores, on its disks, the libraries of emulated modules, emulated computer systems, and emulated target systems. The FCP allows the user to configure his target system onto the MMS hardware, and to interface with his emulated target system during its execution. The software necessary for MMS is also covered. The facility control processor interface (FCPI) is used for downloading large blocks of information to a PE. A PE can send error messages to the FCP through FCPI.
R.K.G.

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N80-34161 Maryland Univ., College Park.
READING HANDWRITTEN WORDS USING HIERARCHICAL RELAXATION Ph.D. Thesis
Kenneth Crawford Hayes 1979 297 p
Avail: Univ. Microfilms Order No. 8021870

The Hand Written Word Reading System (HWWRS) builds a hierarchical description of the words it reads. The HWWRS's first task is to translate the array representation (image) of a word into a geometric graph representation that models the line structures in the word. A stroke graph containing the possible strokes in the word is created by matching structural descriptions of strokes to the geometric graph. The stroke graph is then augmented to a letter-stroke that represents the possible letters of the word by matching structural descriptions of letters to the stroke graph. The letter-stroke graph represents the ambiguous segmentations of the word into letters and strokes that possibly overlap one another. It constitutes the hierarchical description of the input word. The hierarchical description is contextually disambiguated and thus simplified by the application of relaxation procedures. This simplified hierarchical description defines one or possibly a few words. HWWRS reads the input word by picking the most likely word from a list of possible words.
Dissert. Abstr.

N80-34162# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
OPTIMAL CONTROLS THAT MAXIMIZE THE PROBABILITY OF BEING IN A GIVEN SET AT A GIVEN TIME
Yaakov Yavin and Antoinette Venter Jan. 1980 26 p refs Supported in part by Control Data
(CSIR-TWISK-135) Avail: NTIS HC A03/MF A01

An optimal control problem is considered for a class of nonlinear controlled stochastic systems, the states of which are r(m) valued Markov processes. Suppose that an open bounded set d contained in r(m), a subset a contained in d and a time t is greater than 0 are given. The problem is treated of maximizing the probability that the state of the system will be in the set A at the time T after having remained in D throughout the interval [0,T]. Sufficient conditions on optimal controls, of a dynamic programming type, are derived. These conditions require the existence of a smooth solution to a nonlinear partial integro-differential equation. A stochastic secondorder system, describing a perturbed sine wave oscillator, is used as a test case, and a numerical method for computing optimal controls is suggested. The performance of the oscillator for both optimal and optimal control laws, is investigated by computing the probability that the state of the oscilattor will be in a given neighborhood of its limit cycle, and by computing the exptected value of the time it is there.
Author

N80-34163# Council for Scientific and Industrial Research, Pretoria (South Africa).
PROGRAMMING ALTERNATIVES FOR NC MACHINES TOOLS
Jun. 1979 6 p
(TSD-T-79106; ISBN-0-4988-1766-6) Avail: NTIS HC A02/MF A01

Programming methods for numerical control machining are identified and compared. These include manual programming, manual programming with limited aid from a computer control unit, and computer assisted programming using a symbolic, high level language. The required programming activities, staff training or skill, cost of equipment, and the cost per program are outlined for each of the methods. Although the initial cost of equipment is high for the computer assisted technique, the costs per program are comparably low due to the fact that the programmer does not need to carry out coordinate calculations, coding, or tape punching.
M.G.

N80-34164# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ARTIFICIAL INTELLIGENCE: PROMISES OR RESULTS? [INTELIGENCIA ARTIFICIAL: PROMESSAS OU RESULTADOS?]
Celso deRennaeSouza Jul. 1980 11 p refs In PORTUGUESE; ENGLISH summary Presented at Symp. on Artificial Intelligence: Why Try to Make a Computer Think?, Rio de Janeiro, Jul. 1980
(INPE-1834-RPE/196) Avail: NTIS HC A02/MF A01

The computer as a tool to help man in his mental tasks is compared with other traditional tools such as farm tractors, automobiles, telephones, etc. Artificial intelligence is defined and examples are given of intelligent behavior by machines and their software. Propositions to foster debates are included.
S.F.

N80-34165# Ohio State Univ., Columbus. Dept. of Statistics.
STATISTICAL CONSIDERATIONS IN CONTROL MODELS WITH APPLICATIONS
Jagdish S. Rustagi Jul. 1980 30 p refs
(Contract N00014-78-C-0543; NR Proj. 042-403)
(AD-A088663; Rept-5; TR-211) Avail: NTIS HC A03/MF A01 CSCL 12/1

Many applications of control theory, specially in areas other than engineering, require the estimation of the system equations from available data. Applications from patient care system, effect of air pollution on health and dynamic economic models are discussed. A framework is studied in which the control model can be applied using the data provided by the system itself. Special objective functions are utilized to illustrate the technique.
GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N80-34166 British Library Lending Div., Boston Spa (England).
NON-QUADRATIC NOMOGRAPHY, CHAPTER 2
Jun. 1980 27 p refs Transl. into ENGLISH from Vychislitelnaya Matematika (USSR), no. 4, 1959 p 128-149
(BLL-RTS-12290) Avail: British Library Lending Div., Boston Spa, England

The problem of common anamorphosis may be connected with the question of integrating the system of ordinary differential equations and the solution of a system of equations to determine a constant. It is shown that for equations which do not reduce to an equation of the third nomographic sequence, the problem of common anamorphosis can be linked to a solution of a system of algebraic equations.
L.F.M.

N80-34167 British Library Lending Div., Boston Spa (England).
SOME PROBLEMS OF PRACTICAL NOMOGRAPHY
F. S. Khovanskii Sep. 1980 205 p refs Transl. into ENGLISH from Vychislitelnaya Mat. (USSR), v. 4, 1959 p 3-103
(BLL-RTS-11700) Avail: British Library Lending Div., Boston Spa, England

The development of methods for the construction of nomograms is addressed taking into account the practical requirements. Nomograms with an orientated opaque transparency are examined. Different methods of approximate presentation of a function of one variable are then examined. These methods are based on the utilization of nomograms with three degrees of freedom of displacement of a transparency, on the use of nomograms with an orientated transparency, and on the employment of nomograms out of points. The method of constructing approximate nomograms out of points with combined parallel scales is discussed. Finally, the application of nomograms to the study of functional formulas is examined.
M.G.

N80-34168 California Inst. of Tech., Pasadena.
A NUMERICAL BOUNDARY INTEGRAL EQUATION METHOD FOR TRANSIENT MOTIONS Ph.D. Thesis
David Martian Cole 1980 234 p
Avail: Univ. Microfilms Order No. 8021677

The results of a study of a numerical technique for the solution of initial boundary value problems of linear elastodynamics are presented. The numerical method is based on a boundary integral equation (BIE) formulation of the mechanics of bodies of arbitrary shape. These integral equations are discretized and a time stepping technique is used to solve the resulting system of linear algebraic equations. The theoretical basis of the continuous problem and the general interpolation and discretization scheme are described. The problem is then specialized to the two dimensional case of antiplane strain and most subsequent calculations and discussions take place in this context. The consequences of particular interpolation schemes for boundary value problems on a half plane are discussed. The results of several numerical calculations are compared with exact, or much

more accurate solutions. A comparison to the performance of the numerical BIE method with the performance of other specialized numerical procedures which were used previously for problems of this nature is presented. The BIE method yields results which are as accurate, or more accurate than the other methods for given discretization parameters. Dissert. Abstr.

N80-34169 Iowa Univ., Iowa City.
TOPICS IN MODEL COMPLETENESS OF DIRECT POWERS AND DIRECT PRODUCTS OF THEORIES Ph.D. Thesis
Sidkazem Taghva 1980 82 p
Avail: Univ. Microfilms Order No. 8022080

This study is concerned with results about model completeness of theories, or more generally, the notion of n-model completeness of theories. Most results are proven for the model complete version and the corresponding generalized version is stated without proof. Results in the usual framework of properties of finite direct products and finite direct powers are presented. The model completeness of finite products and powers are discussed. For a given finite language L it is shown how to effectively construct a finite extension L* such that whenever A is model complete in L, then A x A is model complete in L*. Moreover, for a given theory T, one can effectively five an axiomatization for T x T in L*. It is shown how to build a finite language extension of L(c) to obtain a language L* in which T sub 1 x T sub 2 is model complete given that T sub 1 and T sub 2 are model complete in L. Dissert. Abstr.

N80-34170 Colorado Univ. at Boulder.
BOUNDARY APPROXIMATION AND TIME STEP CONTROL IN ITERATIVE IMPROVEMENT FOR THE NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS Ph.D. Thesis
Hamid Tadjeran 1980 116 p
Avail: Univ. Microfilms Order No. 8021645

The first objective of this work is to demonstrate that the iterative improvement theory developed by Lindberg can be applied to the alternating direction implicit (ADI) approximation to yield a more accurate (fourth order) solution. Numerical experiments are given to verify this theory. The theory and experiments show that the boundary approximation must be done very carefully in order to achieve this improvement in the accuracy. The second objective is the application of a variant of the idea of iterative improvement to obtain an economical automatic time step control for the finite difference solution of initial boundary value problems. The time step is automatically chosen to balance the spatial and the temporal discretization errors for a given mesh. Numerical results are given to illustrate this theory. Dissert. Abstr.

N80-34171 Miami Univ., Coral Gables, Fla.
GENERALIZED ADDITION SETS Ph.D. Thesis
John Sanford Sumner 1980 248 p
Avail: Univ. Microfilms Order No. 8022895

An (m, n, k, lambda, lambda prime, g) relative addition set, which is a generalization of an addition set and a relative difference set, is defined and studied. It has properties similar to an addition set and a relative difference set. It is shown that there are essentially no nontrivial (m, n, k, lambda, lambda prime, 1) relative addition sets with mn odd. The connections among addition sets, relative addition sets and block designs are studied and it is shown that an addition set and a relative addition set both imply the existence of a partially balanced incomplete block design of a certain order. As a result, a generalization of a well known difference set equation is obtained. A (v, k, lambda, alpha group addition set in a finite group G is defined where alpha: G approaches G is a homomorphism. Many of the same properties of addition sets hold for abelian group addition sets. It is shown that there is no abelian group addition set with v odd or v identical with 2 (mod 4), and alpha = 1, where 1 is the identity automorphism. Examples of both abelian and nonabelian group addition sets are given. Dissert. Abstr.

N80-34172 State Univ. of New York, Stony Brook.
PARAMETER ESTIMATION IN UNDETERMINED SYSTEMS Ph.D. Thesis
Yosefa Shraga 1980 110 p
Avail: Univ. Microfilms Order No. 8021374

The parameter estimation problem is considered in the special case where the number of the unknowns to be determined is greater than the number of the given data points. Two different approaches were tried to solve the problem. In the first a spline technique was used to add more data points. The other approach was to first linearize the given system and then use the generalized inverse solution of the underdetermined linear system. Several modifications were made in these two basic methods. These led to significant improvements in the results. The significance of the difficulties in this class of problems was analyzed, where it is known that the set of solutions is an infinite one, and techniques are suggested to overcome them by defining a concept of pseudo-uniqueness, which results in a unique solution in a certain sense. Dissert. Abstr.

N80-34173 Kent State Univ., Ohio.
TORSION THEORY AND MODULES OF FINITE LENGTH Ph.D. Thesis
Barbara Ann Benander 1980 63 p
Avail: Univ. Microfilms Order No. 8021856

The concept of finite omicron-length for an R-module, where R is a ring and omicron is an idempotent kernel factor, is investigated. It is shown that an omicron-torsion-free module M sub R is omicron-simple if and only if lambda M(*) is simple. This result enables an omicron-torsion-free module M sub R to have finite omicron-length if and only if lambda M(*) has finite length. Furthermore, if M sub R is omicron-torsion-free and has finite omicron-length, then the R-endomorphism ring of M sub R can be embedded in a semiprimary ring. Definitions of indecomposable and directly decomposable idempotent functors are given. Equivalences of each of these concepts are provided. Idempotent kernel functors omicron for which R sub R has the descending chain condition on omicron-closed right ideals (R sub R omicron-Artinian) are investigated. Dissert. Abstr.

N80-34174 Columbia Univ., New York.
ON THE ASYMPTOTIC ANALYSIS OF GRIFFITHS' PERIOD MAPPING Ph.D. Thesis
Jeffry Alan Borror 1980 61 p
Avail: Univ. Microfilms Order No. 8023481

The asymptotic analysis of Griffiths period mapping initiated by Schmid is examined. The approximating nilpotent orbit is studied for the case where the base is a punctured disk to the case where the base is a product of a punctured disk, i.e., the case of a one variable nilpotent orbit with parameter. The differential equations with respect to the parameter of all principal quantites in Schmid's factorization of the lift of the orbit are derived. Mixed Hodge structures are identified as the total space (possibly singular) of a set-theoretic complex vector bundle with base a product of classifying spaces of ordinary Hodge structures and fiber a product of spaces of morphisms of mixed Hodge structures. The generic validity of a result of Cattani and Kaplan concerning the constancy of the monodromy weight filtration in the presence of two Picard Lefschetz transformation is demostrated. Dissert. Abstr.

N80-34175 Texas Univ. at Austin.
AN INVESTIGATION OF TYPE 1 ERROR RATE FOR APPROXIMATE F TESTS OF LINEAR COMBINATIONS OF MEAN SQUARES Ph.D. Thesis
Sheila Ruth Reifle 1980 127 p
Avail: Univ. Microfilms Order No. 8021506

Because appropriate F tests for main effects for three factor random effects analysis of variance (ANOVA) do not exist, type one error rates for two approximate F tests, F', and F'' were investigated. The ANOVA and four types of F tests were performed one thousand times for each set of conditions, and rejection rates for alpha = 0.20, 0.10, 0.05, and 0.01 were studied for each condition. Results indicated that F' and pooled F perform conservatively, having error rates consistently lower than alpha in the absence of a main effect. Rejection rates for F' were extremely low, except in the presence of the larger main effect and cell size of ten for the largest design. In the absence of a main effect, rejection rates for F', F'', and pooled F tended to rise with an increased number of factor levels, but not with increased cell size. The presence of AB effects depressed error rates for the smaller designs, while the presence of ABC effects had no discernable differences from the condition having all null

hypotheses true. Rejection rates did increase with cell size when a main effect was introduced. Dissert. Abstr.

N80-34176 Georgia Univ., Athens.
A UNIT STRATIFICATIONS SAMPLE DESIGN USING ROTATIONAL SAMPLING Ph.D. Thesis
Hsin-Hsien Hank Lu 1980 173 p
Avail: Univ. Microfilms Order No. 8023231

The effect of the repeated sampling procedures on two consecutive occasions is studied when the population is subject to change over time. Several sampling strategies, such as stratification, rotational sampling, and difference estimation are used. To construct the optimum points of stratification (OPS), the procedures are presented by using the standardized normal distribution. For the Neyman optimum, equal, and proportional allocations, the OPS are tabulated for the finite normal population. For a finite discrete population with an unknown distribution, the problem of the construction of strata is dealt with by the approach of superpopulation viewpoint. A two round procedure and its associated computer programs are presented to enhance the effectiveness of this approach. In studying the optimum number of strata, the cost of sampling is also taken into account. The optimum rotational fraction for the repeated sampling the the optimum preassigned constant for differences estimation are also derived. In considering the type of survey design that would be most efficient in repeated sampling, eight sampling plans/ procedures are evolved and compared. Dissert. Abstr.

N80-34177 Case Western Reserve Univ., Cleveland, Ohio.
ASYMPTOTIC ANALYSIS OF LINEAR FILTERING PROBLEMS Ph.D. Thesis
Susan Slaughter Sachs 1980 188 p
Avail: Univ. Microfilms Order No. 8021714

Asymptotic solutions of two linear filtering problems which depend on a small positive parameter, epsilon, are derived by applying singular perturbation methods to the Riccati equations and to the filter equations. The limiting behavior of the Kalman-Bucy filters is established as epsilon approaches zero. Asymtotic expansions of stochastic processes are defined in terms of a quadratic mean asymptotic approximation. The validity of such expansions is proven for regular linear stochastic ordinary differential equations with Gaussian white noise inputs and for linear stochastic ordinary differential equations driven by an ergodic Markov process which tends to Gaussian white noise as epsilon approaches zero. As the observation noise in a linear filtering problem tends to zero, the Kalman-Bucy filter is singular and the filter gains tend to infinity. When the observation noise in a linear filtering problem is not Gaussian noise, no Kalman-Bucy filter can be found. When the observation noise is Gauss-Markov noise with bandwidth proportional to one/epsilon, whch tends to Gaussian white noise as epsilon approaches zero, a Kalman-Bucy filter is derived. The Kalman-Bucy filter is robust for wide bandwidth Gauss-Markov observation noise.
Dissert. Abstr.

N80-34178*# Mississippi State Univ., Mississippi State. Engineering and Industrial Research Station.
ERRORS IN FINITE-DIFFERENCE COMPUTATIONS ON CURVILINEAR COORDINATE SYSTEMS
C. Wayne Mastin and Joe F. Thompson [1980] 19 p refs (Contract NSG-1577)
(NASA-CR-163601; MSSU-EIRS-ASE-80-4) Avail: NTIS HC A02/MF A01 CSCL 12A

Curvilinear coordinate systems were used extensively to solve partial differential equations on arbitrary regions. An analysis of truncation error in the computation of derivatives revealed why numerical results may be erroneous. A more accurate method of computing derivatives is presented. Author

N80-34179# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
REJECTION OF A SINGLE OUTLIER IN A FACTORIAL DESIGN
J. S. Galpin and Douglas M. Hawkins Nov. 1979 23 p refs
(CSIR-TWISK-117) Avail: NTIS HC A02/MF A01

A statistic which was used to test for a single outlier is the maximum normed residual. Accurate bounds are presented for the factiles of the maximum normed residual for two and three factor factorial designs. E.D.K.

N80-34180# National Research Inst. for Mathematical Sciences, Pretoria (South Africa). Mathematics Div.
BOUNDARY CONTROLLABILITY OF HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS
Tunc Geveci Nov. 1979 18 p refs
(CSIR-TWISK-126) Avail: NTIS HC A02/MF A01

Controllability is obtained for a large class of first order hyperbolic systems with constant coefficients, including strictly hyperbolic or symmetric systems, and subject to boundary conditions which result in well posed mixed initial boundary value problems. It is shown that any initial state, u sub o is an element of H(1)(omega), can be steered by boundary control to any final state, u sub T is an element of H(1)(omega), at any time T > T (where omega is included in R(n), n>or=2, is a bounded domain with smooth boundary and T sub o depends on the system and on omega) provided that all rays escape to infinity. M.G.

N80-34181# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
LOCATION OF MULTIPLE OUTLIERS IN FACTORIAL DESIGNS, USING TETRADS
Dan Bradu (Witwatersrand Univ., Johannesburg) Nov. 1979 27 p refs
(CSIR-TWISK-127) Avail: NTIS HC A03/MF A01

It is recognized that it is very difficult to isolate multiple outliers in a factorial design, using residuals. For two way tables a new diagnostic is proposed: the median of the tetrads associated with a cell. It is proved that the procedure can, with arbitrarily high probability, locate sufficiently aberrant outliers. The use of a half normal plot provides a good indicator of the actual number of outliers in the table. Author

N80-34182# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
POWER SERIES EXPANSION FOR A CROSSING-SYMMETRIC VERTEX FUNCTION
W. D. Heiss Dec. 1979 16 p refs
(CSIR-TWISK-134) Avail: NTIS HC A02/MF A01

Starting from a nonlinear system of coupled integral equations for the vertex parts which are irreducible with respect to the s, t and u channel, a power series is found for the full vertex function in terms of the vertex part gamma (0) which is irreducible with respect to all channels. The problem of finding an expression in closed form remains unresolved, since higher order products in gamma (0) are nonassociative. In a simplified model, the mathematical properties of the series seem to allow successive rational approximations. Specific reference is made to the Green's function formulation of the many body theory. M.G.

N80-34183# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
TESTING FOR EQUALITY OF VARIANCE OF CORRELATED NORMAL VARIABLES
Douglas M. Hawkins Feb. 1980 10 p refs
(CSIR-TWISK-136) Avail: NTIS HC A02/MF A01

A standard test exists for whether bivariate normal data of arbitrary correlation have equal variances. An extension of this model is useful to test whether two measuring instruments, with which repeated measurements were made on each of n units, have equal error variances. One or two simple F-distributed statistics yield performance comparable with that of the generalized likelihood ratio statistic. R.K.G.

N80-34184# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ORDINARY DIFFERENTIAL EQUATIONS [EQUACOES DIFFENCIAIS ORDINARIAS]
Rene A. Medrano-B May 1980 228 p refs In PORTUGUESE; ENGLISH summary Revised
(INPE-1753-RPE/144) Avail: NTIS HC A11/MF A01

First order and higher order differential equations are concisely treated. Among the first order equations, the cases of separable variables, exacts, integration factors, homogeneous, isobarics, eigenvalues problems in systems of equations are presented and

the existence and uniqueness of the solutions are discussed. Higher order linear differential equations with constant coefficients are studied and the methods of undetermined coefficients, operators, variation of parameters, and the integral transforms (Fourier, Fourier-Sine, Fourier-Cosine and Laplace) are examined. For the linear equations with variable coefficients, the reduction of the equation's order, whenever possible and convenient, is first considered. The power series solution (Frobenius series) around ordinary and regular singular points is treated. As examples of the series solutions, differential equations, well known in physics, like the Legendre, Bessel, Laguerre, Schrodinger, Hermite and Associated Legendre differential equations are solved. Special cases of nonlinear differential equations are also included. A.R.H.

N80-34185# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

DETERMINING THE FORM FACTORS OF PLANE AND CYLINDRICAL SURFACES BY NUMERICAL METHODS [DETERMINACHO DE FATORES DE FORMA ENTRE SUPERFICIES PLANAS E CILINDRICAS ATRAVES DE METODOS NUMERICOS]

Olavo Bueno deOliveiraFilho, Wolodymir Boruszewski, Humberto Pontes Cardoso, and Nelson Montagnana Junior Jul. 1980 17 p refs In PORTUGUESE; ENGLISH summary Presented at 32nd Meeting of SPBC, 6-12 Jul. 1980 Revised

(INPE-1815-RPE/183) Avail: NTIS HC A02/MF A01

Computation of configuration factors for plane to plane surfaces and plane to cylinder surfaces is discussed. An algorithm which uses numerical integration is presented in charts with 3 percent precision. The calculations apply to energy transfer problems, including radiant energy. S.F.

N80-34186# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).

A CUSUM FOR A SCALE PARAMETER

Douglas M. Hawkins Dec. 1979 14 p refs

(CSIR-TWISK-130) Avail: NTIS HC A02/MF A01

Problems associated with the use of cumulative sum control charts in quality control and regression analysis are examined. If X is a normal variate with zero mean and variance omicron (2), is very nearly normal with mean 0.822 and variance 0.122, and this distribution is robust to heavy-tailed departures from model in the X. The use of Y is proposed for cumulative sums to detect changes in the scale parameter. M.G.

N80-34187# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

OPTIMAL LINEAR ESTIMATION APPLIED TO THE GENERATION OF A DIRECT METHOD FOR INVESTIGATING PARAMETER OPTIMIZATION

Atair Rios Neto Aug. 1980 6 p refs In PORTUGUESE; ENGLISH summary Submitted for publication

(INPE-1855-RPE/209) Avail: NTIS HC A02/MF A01

Nonlinear parameter optimization problems are presented. A linear perturbation procedure is adopted with a criterion of direct search in the direction of the objective function gradient and in the direction of meeting the constraints. Associating this to an interpretation of the errors as random variables, one reduces, in each iteration, the determination of the search increment to an optimal linear estimation, using the Kalman filter. S.F.

N80-34188*# Santa Clara Univ., Calif. School of Engineering.

ON ONE-DIMENSIONAL STRETCHING FUNCTIONS FOR FINITE-DIFFERENCE CALCULATIONS Final Report, 1 Jul. 1978 - 30 Jun. 1979

Marcel Vinokur Oct. 1980 57 p refs

(Contract NsG-2086)

(NASA-CR-3313) Avail: NTIS HC A04/MF A01 CSCL 12A

The class of one dimensional stretching function used in finite difference calculations is studied. For solutions containing a highly localized region of rapid variation, simple criteria for a stretching function are derived using a truncation error analysis. These criteria are used to investigate two types of stretching functions. One is an interior stretching function, for which the location and slope of an interior clustering region are specified. The simplest such function satisfying the criteria is found to be one based on the inverse hyperbolic sine. The other type of function is a two sided stretching function, for which the arbitrary slopes at the two ends of the one dimensional interval are specified. The simplest such general function is found to be one based on the inverse tangent. The general two sided function has many applications in the construction of finite difference grids. E.D.K.

N80-34189# Basel Univ. (Switzerland). Mathematics Inst.

TOPICS IN ANALYSIS Final Technical Report, 1 Jul. 1978 - 30 Sep. 1979

Alexander M. Ostrowski Sep. 1979 9 p

(Grant DA-ERO-78-G-068; DA Proj. 1T1-61102-BH-57)

(AD-A080463) Avail: NTIS HC A02/MF A01 CSCL 12/1

The research performed under this grant deals with some classical problems in the area of algebra. Considerable progress has been made from a theoretical point of view. There were two main topics: (1) Newton-Sylvester theorems on the number of zeros of a function in an open interval, (2) reversible transformations in algebraic geometry. The specific results are: A simplified proof of a sharpening of Sylvester's theorems, obtained by replacing the values of the functions considered at a and b with their values at a-0 and b-0. In this way the result of Marchand can be improved. Further improvements are pointed out for Sylvester's theorems and Newton's Rule. The reversible transformation of space elements can be characterized, starting from ordinary one to one transformations between two convenient spaces and the complete sets of integrals of certain partial differential equations, which can be expressed by convenient determinants. GRA

N80-34190# Pennsylvania State Univ., University Park. Dept. of Industrial and Management Systems Engineering.

ADVANCES IN MULTICRITERIA ENGINEERING DESIGN: COMPUTATIONAL TECHNIQUES. MULTIOBJECTIVE ENGINEERING DESIGN VIA NONLINEAR GOAL PROGRAMMING Final Report

Terrence L. Elcluk, Taeyong Yang, and James P. Ignizio Jul. 1980 129 p refs

(AD-A088570) Avail: NTIS HC A07/MF A01 CSCL 09/2

The procedure for solving large-scale, nonlinear multiobjective optimization problems requires the use of a computer coded algorithm which is both computationally efficient and mathematically valid. The multicriteria methodology, goal programming, has proven to be an effective technique for the solution of such problems. The problem was the synthesis of the goal programming methodology into an efficient computer algorithm which could be used by the problem solver to solve a general class of nonlinear, multiobjective (NLGP) engineering design problems. Three such codes were developed into a computer package. Each code is capable of solving an NLGP problem. Each code has modifications which make it more attractive than the others for application to particular types of NLGP problems. The results show that these codes are effective tools for solving nonlinear goal programming design problems. Author

N80-34191# Michigan Univ., Ann Arbor. Dept. of Mathematics.

APPLICATIONS OF NON-SELF-ADJOINT OPERATOR THEORY TO THE SINGULARITY EXPANSION METHOD (SEM) AND THE EIGENMODE EXPANSION METHOD (EEM) IN ACOUSTIC AND ELECTROMAGNETIC PROBLEMS Final Report, 1 Jun. 1979 - 31 May 1980

Charles L. Dolph Jul. 1980 23 p refs

(Contract F49620-79-C-0128; AF Proj. 2304)

(AD-A088747; AFOSR-80-0689TR) Avail: NTIS HC A02/MF A01 CSCL 20/3

Eigenfunction expansions for nonselfadjoint operators are important for scalar and electromagnetic wave scattering. Two methods: the Singularity Expansion Method (SEM), and the Eigenmode Expansion Method (EEM) which had been developed separately were studied. Criteria for their validity were established; moreover, the poles of the Green's function of the SEM are in 1-1 correspondence with the zeros of the eigenvalues of the EEM. A constructive numerical process for determining the poles of the Green's function was developed. Among several other results was the establishment of variational principles for the spectrum of compact non-self-adjoint operators. Another research area was the singularity behavior of eigenfunction expansions of various Green's functions in electromagnetic theory. The principal

result shows that in an eigenfunction of a typical Green's function the point singularity of a Green's function is represented by a layer of surface singularity. This characteristic is analogous to the Gibbs' phenomenon where the representation of a discontinuous function by an orthogonal expansion creates the spikes which are absent in the original function. GRA

N80-34192# Kentucky Univ., Lexington. Dept. of Mathematics.
STRUCTURES AND ALGORITHMS IN STOCHASTIC REALIZATION THEORY AND THE SMOOTHING PROBLEM
Interim Technical Report Ph.D. Thesis
Faris Abdul-Jabbar Badawi Jun. 1980 149 p refs
(Grant AF-AFOSR-3519-78; AF Proj. 2304)
(AD-A086465; AFOSR-80-0458TR) Avail: NTIS HC A07/MF A01 CSCL 12/1

Some geometric questions concerning the solution set of the positive real lemma and a Hamiltonian framework for the non Riccati algorithms of Kailath and Lindquist are considered. These are then applied to the stochastic realization problem. The basic techniques and concepts of the strict sense (proper) stochastic realization theory of Lindquist and Picci and Ruckebusch are applied to the discrete time smoothing problem. This provides a natural interpretation of the Mayne Fraser two point formula as well as many other smoothing results, the interpretations of which was so far quite unclear from a probabilistic point of view. R.K.G.

N80-34193# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
VARIATIONAL METHODS OF CONVOLUTION INTEGRAL AND OF LARGE SPRING CONSTANTS: A NUMERICAL COMPARISON
Julian J. Wu Jun. 1980 20 p refs Presented at Army Numerical Analysis and Computer Conf., Moffet Field, Calif., 20-21 Feb. 1980
(AD-A088902; AD-E440085; ARLCB-TR-80019) Avail: NTIS HC A02/MF A01 CSCL 12/1

Finite element solution formulations have been carried out for a simple initial value problem based on two different variational statements; that of convolutional integral developed by Gurtin and that of large spring constants adapted by this writer for initial value problems. Numerical results indicate that both generate convergent solution to the given initial value problem of a spring-mass system subjected to a harmonic forcing function. GRA

N80-34194# National Technical Information Service, Springfield, Va.
THE USE OF COMPUTERS IN SOLVING MATHEMATICAL PROBLEMS. CITATIONS FROM THE NTIS DATA BASE
Progress Report, 1976 - Jun. 1980
George W. Reimherr Jul. 1980 130 p Supersedes NTIS/PS-79/0798; NTIS/PS-78/0782
(PB80-813298; NTIS/PS-79/0798; NTIS/PS-78/0782) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

Reports are cited on the computer solution of algebraic and differential equations. The necessary software and hardware for implementation, as well as solutions to large sparse matrices, stiff differential equations, and statistical problems, are included. Some of the research is directly applicable to various physical sciences. This updated bibliography contains 123 citations, 16 of which are new entries to the previous edition. GRA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N80-34195 Texas Univ. at Arlington.
THE APPLICATION OF GENERALIZED GROUP INVERSE TO DISCRETE FINITE MARKOV CHAINS Ph.D Thesis
Atur Venkata Radhakrishna 1980 122 p
Avail: Univ. Microfilms Order No. 8022977

The group inverse of a product of two matrices called the inverse order law is established, formulae connecting group inverse and pseudo-inverse are derived and a formula for computation of group inverse is derived. Secondly, the group inverse is used in analyzing the properties of discrete finite Markov chains. The properties of regular and ergodic chains are dealt with through the use of group inverse of a matrix. Finally numerical examples are formulated to clarify the results. Dissert. Abstr.

N80-34196 Rutgers - The State Univ., New Brunswick, N. J.
ANALYSIS OF ORDERED AND PARTIALLY ORDERED CATEGORICAL DATA Ph.D. Thesis
Yu-Chung Jeff Wang 1980 123 p
Avail: Univ. Microfilms Order No. 8022600

For categorical data there exists, in most cases, an implicit ordering among categories, for example the no ordering and complete ordering. The partially ordered scale is introduced to generalize the concept of ordering relation. Partially ordered data include nominal data and ordinal data as extreme cases. In reality, data collected in education and social science are often partially ordered. Approaches are developed to analyze categorical data where either the rows or columns of the contingency table are partially ordered. The problem of estimating cell probabilities of multiway contingency tables is considered. Two way tables are used as examples to clearly demonstrate this approach. Depending on the ordering among categories, the multinominal likelihoods of the contingency tables are reparameterized. The cell counts are transformed to become the proper sufficient statistics for the transformed cell probabilities, the natural parameters of the likelihood. The reparameterization is completely general for all partial orderings. Dissert. Abstr.

N80-34197 Georgia Univ., Athens.
INTERVAL ESTIMATION, RANKING AND SELECTION PROCEDURES Ph.D. Thesis
Paul Jeih Tsai 1980 185 p
Avail: Univ. Microfilms Order No. 8023184

A single stage sample procedure is proposed for obtaining an optional confidence interval on the largest (or smallest) mean of multivariate normal populations. In the case of independent normal populations, various factors are considered: variance (known or unknown, equal or unequal), sample size (equal or unequal), and the optional confidence interval (two sided or one sided). The optional confidence interval is proposed for the case in which multivariate normal populations have common known correlation coefficients and common variance either known or unknown. The percentage points and programs to apply those procedures are also provided. Selection procedures for the best population are proposed for multivariate normal populations with common variance and common known correlation coefficients. The estimation of probability of correct selection (pcs) is discussed. The asymptotic distribution of pcs is derived and the computer program to evaluate the asymptotic variance of pcs is given. Dissert. Abstr.

N80-34198 Oregon State Univ., Corvallis.
ESTIMATION OF THE POPULATION TOTAL WHEN THE SAMPLE IS TAKEN FROM A LIST CONTAINING AN UNKNOWN AMOUNT OF DUPLICATION Ph.D. Thesis
Suey-Huey Tarng 1980 93 p
Avail: Univ. Microfilms Order No. 8021945

A frame contains a known number, N, of units, but the units are grouped into an unknown number of M distinct classes. A measurement yj is associated with each class, and, based on the information obtained from a simple random sample of units from the frame, we wish to estimate the population total without knowing M. Five methods for estimating M based M9 sample are generalized to obtain estimates of the population total. Dissert. Abstr.

N80-34199 Cornell Univ., Ithaca, N. Y.
THE PROBABILITY OF SURVIVAL OF REDUNDANT SYSTEMS UNDER A STATIC LOAD Ph.D. Thesis
Carl Frederick Diegert 1980 156 p
Avail: Univ. Microfilms Order No. 8020810

The Daniels criterion to coherent systems is analyzed and static analysis based on this is shown to be appropriate when component load shares satisfy a monotonicity property a component's load share never decreases after the failure of another

component shown to be that, among a wide class of load sharing rules, any violation of monotonicity implies that survival of a system may depend on the dynamics of a sequence of component failure, making static analysis possibly incorrect. Computation of system reliability (as defined by Daniels survival criterion) may be simplified when load sharing is monotone, and further simplified when component strengths are independent. Four recursive equations, any of which may be used to compute the probability that a coherent system survives are given. The problem of designing mechanical systems of physically identical and parallel members under tensile load, with each member spanning given length is discussed. The recursive equations are used to find alternative designs of various specified reliabilities.Dissert. Abstr.

N80-34200 Southern Methodist Univ., Dallas, Tex.
SOME SCREENING PROCEDURES BASED ON DATA FROM A SINGLY TRUNCATED BIVARIATE NORMAL DISTRIBUTION Ph.D. Thesis
Youn-Min Chou 1980 110 p
Avail: Univ. Microfilms Order No. 8021674

A screening procedure based on data from a singly truncated bivariate normal (TBVN) distribution was studied. A sampling acceptance criterion based on a linear combination of the largest order statistic from a truncated normal population and the truncation point is discussed. The moment generating function, bivariate moments, bivariate correlation coefficient in a singly TBVN sample is derived and tabulated for sample sizes 3, 15 and 50. This is utilized to obtain a 100 nu percent lower confidence limit on rho. A double series expression for the density function of R is included. Dissert. Abstr.

N80-34201# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
STRICT CHEBYSHEV APPROXIMATION OF DISCRETE DATA
M. Brannigan and L. M. Vecter Dec. 1979 17 p refs
(CSIR-TWISK-133) Avail: NTIS HC A02/MF A01

An algorithm is presented for computing the strict Chebyshev approximation of discrete data, particular consideration being given to the case when the matrix is rank deficient. This algorithm, which is of the ascent-exchange type, is compared with two other published algorithms in which use is made of the usual linear programming techniques, the tests showing that the present algorithm is more accurate than the others. Author

N80-34202# Basel Univ. (Switzerland). Mathematics Inst.
ON REVERSIBLE TRANSFORMATIONS OF SPACE ELEMENTS
Alexander M. Ostrowski Sep. 1979 91 p Sponsored in part by Swiss National Science Foundation
(Grant DA-ERO-75-G-035)
(AD-A080447; BMN-53) Avail: NTIS HC A05/MF A01 CSCL 12/1

A one to one transformtion between two (n + k)-dimensional spaces (x sub nu, r sub mu and y sub nu, s sub mu) is constructed and the necessary and sufficient conditions which must be satisfied in order that there exist a reversible transformation are derived. M.G.

N80-34203# Texas A&M Univ., College Station. Inst. of Statistics.
HOW NEAR IS A NEAR-OPTIMAL SOLUTION: CONFIDENCE LIMITS FOR THE GLOBAL OPTIMUM
Robert L. Sielken, Jr. and Howard M. Monroe May 1980 96 p refs
(Contract N00014-78-C-0426; NR Proj. 047-179)
(AD-A089108; THEMIS-TR-62) Avail: NTIS HC A05/MF A01 CSCL 12/1

For many optimization problems approximate or near-optimal solutions are the only practical solutions available. This paper identifies and compares some procedures which use independent near-optimal solutions to determine a confidence limit such that, with a user specified confidence, the global optimum is between the best near-optimal solution and the confidence limit. A computer implementation of the procedures is available from the authors. GRA

N80-34204# Ohio State Univ., Columbus. Dept. of Statistics.
ESTIMATION OF THE LARGER MEAN
Ishwari D. Dhariyal (Indian Inst. of Tech., Kanpur), Edward J. Dudewicz, and Saul Blumenthal (Illinois Univ., Urbana) Jul. 1980 23 p refs
(Contract N00014-78-C-0543; NR Proj. 042-043)
(AD-A088661; TR-188) Avail: NTIS HC A02/MF A01 CSCL 12/1

Estimation of the larger of two normal means mu 1 and mu 2 is studied. Two new estimators are studied for this problem, the maximum probability estimator and the iterated bias elimination estimators. If abs. val. mu 1 - mu 2 is not close to zero (as evidenced by a strongly consistent estimator), a maximum probability estimator is seen to be best as regards both bias and mean-squared error. GRA

N80-34205# Indiana Univ. at Bloomington. Dept. of Mathematics.
MAXIMUM LIKELIHOOD ESTIMATION FOR STATIONARY POINT PROCESSES Interim Report
Pham-Dinh Tuan and Madan L. Puri (Grenoble Univ., France) Aug. 1980 29 p refs
(Grant AF-AFOSR-2927-76; AF Proj. 2304)
(AD-A089117; AFOSR-80-0688TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

In this paper we derive the log likelihood function for point processes in terms of their stochastic intensities, using the martingale approach. For practical purposes we work with an approximate log likelihood function which is shown to possess the usual asymptotic properties of a log likelihood function. The resulting estimates are strongly consistent and asymptotically normal (under some regularity conditions). As a by-product, a strong law of large numbers and a central limit theorem for continuous martingale are derived. GRA

N80-34206# Agbabian Associates, El Segundo, Calif.
A FIRST-ORDER METHODOLOGY FOR CALCULATING PROBABILITY OF MISSION SUCCESS Final Report, 1 Aug. 1978 - 31 Jan. 1979
Carl F. Bagge and David Rothman 31 Jan. 1980 75 p refs
(Contract DNA001-78-C-0373)
(AD-A088910; AD-E300896; AA-R-7914-4702; DNA-4843F)
Avail: NTIS HC A04/MF A01 CSCL 15/7

A first-order methodology for calculating the probability that a system will successfully complete its mission was developed, illustrated, and validated. The methodology is directed to analysts, designers, managers, physicist, and planners who are unaccustomed to working with statistics and probability theory, but who are assumed to have had an introductory course in statistics and probability theory. The methodology, which makes use of closed-form solutions and is quite transparent, is designed to yield results quickly and without the use of a large computer. It is not intended to replace the formal, more accurate computerized methodologies that use Monte Carlo simulations or numerical partitioning. Within its specified applicable domain, the methodology yields quantitatively accurate results. The applicable domain is sufficiently large to encompass many problems of interest to the Defense Nuclear Agency community. GRA

N80-34207# Virginia Polytechnic Inst., Blacksburg. Dept. of Industrial Engineering and Operations Research.
GENERALIZED INVERSES AND THEIR APPLICATION TO APPLIED PROBABILITY PROBLEMS
Jeffrey J. Hunter May 1980 59 p refs
(Contract N00014-77-C-0743; Grant NSF ENG-77-22757)
(AD-A089069; VTR-80-06) Avail: NTIS HC A03/MF A01 CSCL 12/1

The main aim of this paper is to examine the applicability of generalized inverses to a wide variety of problems in applied probability where a Markov chain is present either directly or indirectly through some form of imbedding. By characterizing all generalized inverses of I-P, where P is the transition matrix of a finite irreducible discrete time Markov chain, we are able to obtain general procedures for finding stationary distributions, moments of the first passage time distributions and asymptotic forms for the moments of the occupation time random variables. It is shown that all known explicit methods for examining these

problems can be expressed in this generalized inverse framework. More generally, in the context of a Markov renewal process setting the aforementioned problems are also examined using generalized inverses of I-P. As a special case Markov chains in continuous time are considered and we show that the generalized inverse technique can be applied direct to the infinitesimal generator of the process, instead of to I-P, where P is the transition matrix of the discrete time jump Markov chain. GRA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N80-34208 Princeton Univ., N. J.
UNIVERSAL APPROXIMATIONS OF CONTROL SYSTEMS OVER FINITE TIME Ph.D. Thesis
Vicente Costanza 1980 99 p
Avail: Univ. Microfilms Order No. 8022722

A computer program which obtains an accurate internal description of a given practical system, from a finite number of external experiments (input-output data) is developed. The finiteness requirement implies that the inputs must be allowed to take values on some bounded set of real numbers. Attention is restricted to the behavior of the system over some finite period of time; this restriction is a theoretical one. Indeed, the mathematical results upon which the algorithm is constructed are not valid over infinite time. Therefore, the realizations generally fail to predict the asymptotic behavior of the given system, as well as its response to extreme values of the control. The approach is to be deterministic. The possibility of measurement errors is realized, however the experimental data is considered exact and the internal descriptions are judged by their ability to reproduce this information. The single input-single output scheme is adopted for simplicity of notation and exposition. The generalization to finite number of inputs and outputs involves no theoretical complication. Dissert. Abstr.

N80-34209*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SELF-REPLICATING SYSTEMS: A SYSTEMS ENGINEERING APPROACH
Georg vonTiesenhausen and Wesley A. Darbro Jul. 1980 63 p refs
(NASA-TM-78304) Avail: NTIS HC A04/MF A01 CSCL 12B

A first approach to conceptualize self-replicating systems was developed from past and present abstract theories. The engineering elements of self-replicating systems are defined in terms of a basic reference system. A number of options are investigated. The growth characteristics and their problems are analyzed, the mathematics of various exponential growth options are outlined, and the problems of universal parts production and systems closure are discussed. Selected areas of further study are defined and a 20 year development and demonstration program is presented. Author

N80-34210# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). National Council of Scientific and Technical Research.
CONSISTENCY, REDUNDANCY AND EXTENSION IN FUZZY SYSTEMS FOR REGRESSIVE DECISION [CONSISTENCIA, REDUNDANCIA E EXTENSOES NEBULOSAS DE SISTEMAS DE REGRAS DE DECISAO]
Paulo Ouvera Simoni Aug. 1980 29 p refs In PORTUGUESE
(INPE-1850-RPE/207) Avail: NTIS HC A03/MF A01

The variety of determination formulas used in knowledge systems is explored. While the formulas often conflict due to their inflexibility, a series of algorithms is proposed which allows for a wide range of applications to spectral analysis, medical diagnosis, geological surveys, and system failure. Transl. by S.F.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N80-34211# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
TENSOR PRODUCTS AND BANACH IDEALS OF P-COMPACT OPERATORS
Jan H. Fourie (Univ. of South Africa) Dec. 1979 13 p refs
(CSIR-TWISK-132) Avail: NTIS HC A02/MF A01

The norm w sub p ($1 < or = p < or = infinity$) on the tensor product of two Banach spaces E and F is studied. It is shown that w sub p is a tensor norm, and a representation is deduced for the elements in the completion absolute product of E and sub w sub pF of absolute product of E and F equipped with w sub p. Finally it is shown that the w sub p nuclear operators coincide with those operators factoring compactly through l(p) (if $1 < or = p < infinity$) or c sub o (if $p = infinity$), with related equalities concerning the ideal norms. M.G.

N80-34212# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
THE STABILITY OF PLANAR DYNAMICAL SYSTEMS LINEAR-IN-CONES
M. Pachter and D. H. Jacobson Jan. 1980 15 p refs Supported in part by Control Data
(CSIR-TWISK-137) Avail: NTIS HC A02/MF A01

A class of nonlinear systems in the plane which are piecewise linear, i.e., system linear-in-cones, was analyzed. A complete characterization was given of the stability and stabilizability properties of such systems in terms of the system data. L.F.M.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N80-34213 Ohio State Univ., Columbus.
EXCITATION OF SPIN WAVES AT MAGNETIC DOMAIN WALLS Ph.D. Thesis
Pradeep Shrikrishna Limaye 1980 112 p
Avail: Univ. Microfilms Order No. 8022305

The low field excitation of spin waves at domain walls in thin film magnetic garnets was studies. These excitations were observed as a low intensity signal at fields below saturation in a microwave absorption experiment. A phenomenological model was developed to account for the frequency dependence of the observed signal. In this model the material was assumed to be lossless and the excitations at neighboring walls were isolated by phenomenological boundary conditions. The spinwave solutions of the linearized equations of motion of the magnetization were box normalized to obtain the k-dependence of the signal. The calculated k-dependence was found to be in excellent agreement with the experiment. The bias-field dependence of the power absorption was calculated for the one domain wall model and was found to be in very good agreement with the observed line shape. Dissert. Abstr.

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N80-34214 Georgetown Univ., Washington, D.C.
NON-SPECULAR ULTRASONIC BOUNDED BEAM TRANSMISSION THROUGH SOLID PLATES Ph.D. Thesis
Kin Wah Ng 1979 93 p
Avail: Univ. Microfilms Order No. 8021996

Two approximations to be plane wave transmission coefficient were constructed using the complex poles and zeroes of the plane wave reflection coefficient. Using these approximations,

expressions describing the transmitted beam profile was derived. In the theories of Bertoni and Tamir and of Pitts, useful descriptions of the reflected beam profile obtained by considering only one pole in the approximations to the reflection coefficient. In the case of the transmitted beam profile more than one pole was needed in the approximation to the transmission coefficient; the number of poles needed depended on the proximity of the complex poles. The total profile was viewed as the interference of several single pole profiles, the contribution of each being weighed by that pole's location in the complex plane. Theoretical and experimental results for a brass plate in water are presented for comparison. Dissert. Abstr.

N80-34215*# Kansas Univ., Lawrence. Dept. of Aerospace.
ACOUSTIC PLANE WAVES INCIDENT ON AN OBLIQUE CLAMPED PANEL IN A RECTANGULAR DUCT
Hillel Unz and Jan Roskam Aug. 1980 137 p refs
(Contract NCC1-8)
(KU-FRL-417-14; NASA-CR-163624) Avail: NTIS HC A07/MF A01 CSCL 20A

The theory of acoustic plane waves incident on an oblique clamped panel in a rectangular duct was developed from basic theoretical concepts. The coupling theory between the elastic vibrations of the panel (plate) and the oblique incident acoustic plane wave in infinite space was considered in detail, and was used for the oblique clamped panel in the rectangular duct. The partial differential equation which governs the vibrations of the clamped panel (plate) was modified by adding to it stiffness (spring) forces and damping forces. The Transmission Loss coefficient and the Noise Reduction coefficient for oblique incidence were defined and derived in detail. The resonance frequencies excited by the free vibrations of the oblique finite clamped panel (plate) were derived and calculated in detail for the present case. T.M.

N80-34216*# Wyle Labs., Inc., Hampton, Va.
A FEASIBILITY STUDY OF A 3-D FINITE ELEMENT SOLUTION SCHEME FOR AEROENGINE DUCT ACOUSTICS Final Report, Mar. 1978 - Nov. 1979
A. Louis Abrahamson 15 Sep. 1980 37 p refs
(NASA-CR-159359; Rept-51200) Avail: NTIS HC A03/MF A01 CSCL 20A

The advantage from development of a 3-D model of aeroengine duct acoustics is the ability to analyze axial and circumferential liner segmentation simultaneously. The feasibility of a 3-D duct acoustics model was investigated using Galerkin or least squares element formulations combined with Gaussian elimination, successive over-relaxation, or conjugate gradient solution algorithms on conventional scalar computers and on a vector machine. A least squares element formulation combined with a conjugate gradient solver on a CDC Star vector computer initially appeared to have great promise, but severe difficulties were encountered with matrix ill-conditioning. These difficulties in conditioning rendered this technique impractical for realistic problems. A.R.H.

N80-34217*# Sikorsky Aircraft, Stratford, Conn.
AN EVALUATION OF A COMPUTER CODE BASED ON LINEAR ACOUSTIC THEORY FOR PREDICTING HELICOPTER MAIN ROTOR NOISE Final Report
S. Jon Davis and T. Alan Egolf Jul. 1980 290 p refs
(NASA-CR-159339; SER-510038) Avail: NTIS HC A13/MF A01 CSCL 20A

Acoustic characteristics predicted using a recently developed computer code were correlated with measured acoustic data for two helicopter rotors. The analysis, is based on a solution of the Ffowcs-Williams-Hawkings (FW-H) equation and includes terms accounting for both the thickness and loading components of the rotational noise. Computations are carried out in the time domain and assume free field conditions. Results of the correlation show that the Farrassat/Nystrom analysis, when using predicted airload data as input, yields fair but encouraging correlation for the first 6 harmonics of blade passage. It also suggests that although the analysis represents a valuable first step towards developing a truly comprehensive helicopter rotor noise prediction capability, further work remains to be done identifying and incorporating additional noise mechanisms into the code. A.R.H.

N80-34218*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PREDICTED AIRFRAME NOISE LEVELS
J. P. Raney Sep. 1980 10 p refs
(NASA-TM-81849) Avail: NTIS HC A02/MF A01 CSCL 20A

Calculated values of airframe noise levels corresponding to FAA noise certification conditions for six aircraft are presented. The aircraft are: DC-9-30; Boeing 727-200; A300-B2 Airbus; Lockheed L-1011; DC-10-10; and Boeing 747-200B. The prediction methodology employed is described and discussed. R.K.G.

N80-34219*# Boeing Commercial Airplane Co., Seattle, Wash.
AIRCRAFT NOISE PREDICTION PROGRAM VALIDATION Final Report
Belur N. Shivashankara Oct. 1980 163 p
(Contract NAS1-15526)
(NASA-CR-159333; D6-48727) Avail: NTIS HC A08/MF A01 CSCL 20A

A modular computer program (ANOPP) for predicting aircraft flyover and sideline noise was developed. A high quality flyover noise data base for aircraft that are representative of the U.S. commercial fleet was assembled. The accuracy of ANOPP with respect to the data base was determined. The data for source and propagation effects were analyzed and suggestions for improvements to the prediction methodology are given. T.M.

N80-34220*# Stanford Univ., Calif.
SINGLE CHIP LENSES FOR ULTRASONIC IMAGING Final Report, 30 Sep. 1977 - 29 Sep. 1979
James D. Meindl 29 Sep. 1979 57 p refs
(Contract F49620-77-C-0133; ARPA Order 3448; AF Proj. 3448)
(AD-A088857; AFOSR-80-0699TR) Avail: NTIS HC A04/MF A01 CSCL 20/1

During this program, the theoretical understanding of Cascade Charge Coupled Device (C3D) electronic lenses have been greatly extended. Specifically, the attenuation effects of transfer efficiency were found to be deterministic and insignificant, lateral resolution and sidelobe response were not to be serious limitations, while for moderate values of charge-transfer inefficiency, spatial shifting of beamsteering angle was found to be minor. In addition, a novel analysis of the device performance substantiated that aberations resulting from the intermodulation process would, in most practical cases, not limit system performance. Also during this program, the fabrication process for the device was optimized. This includes optimizing of the polysilicon electrode conduction and the channel length. An advanced lens incorporating the cumulative design rules resulting from this program has been fabricated. This device, a 32 channel, 10,000 charge coupled element lens, will be used in 4.5 MHz imaging system to be developed under another program. GRA

N80-34221*# Pennsylvania State Univ., University Park. Applied Research Lab.
QUANTITATIVE SCHLIEREN ANALYSIS OF ACOUSTIC INTERACTION WITH SUBMERGED PLATES Ph.D. Thesis
Roger Thomas Richards 24 Jun. 1980 157 p refs
(Contract N00024-79-C-6043)
(AD-A089066; ARL/PSU-TM-80-139) Avail: NTIS HC A08/MF A01 CSCL 20/1

The transmission and radiation of sound from submerged plates are investigated by means of a quantitative Schlieren method which produces accurate visual representations of sound fields. The method is shown to have significant advantages over the usual time consuming, point by point scans of acoustic fields. Previous investigations have shown the feasibility of quantizing Schlieren data, and this investigation demonstrates a dramatic improvement in the accuracy of that data, reducing the standard error to under one decibel which places the accuracy of the method on equal footing with other acoustic measurement systems. The further addition of stroboscopic techniques enables the resolution of individual acoustic waves and permitted the differentiation between standing waves and progressive waves. The low frequency resolution of the classical Schlieren system was also improved by nearly two orders of magnitude; sound waves as low as 27 kHz were easily visualized. These improve-

ments in the quantitative Schlieren system are demonstrated by a thorough study of transmission of sound through submerged metal plates over a study of transmission of sound through submerged metal plates over a frequency range extending from below to over one hundred times the classical coincidence frequency. Recent theoretical descriptions of the lowest order symmetrical Lamb mode are confirmed, and cancellation of modal pairs of Lamb waves with increasing frequency is observed.GRA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N80-34222 California Univ., Los Angeles.
ENERGY TRANSFER IN IONIC AND MOLECULAR SYSTEMS Ph.D. Thesis
William Dane Hopewell 1980 208 p
Avail: Univ. Microfilms Order No. 8023321

Several examples of electronic energy transfer in molecular ionic systems were investigated using time resolved laser spectroscopy. The studies using molecules were concerned with nonradiative electronic energy trasnfer from the excited singlet to the lowest triplet (ISC) and the ground state (IC) in camphorquinone. A theoretical model that predicts the ratio of IC/ISC in molecules containing a progression in a single vibrational mode in their fluorescence absorption spectra, was used to explain the observed changes of the fluorescence lifetime as function a excess vibrational energy deposited of camphorquinone. Dilute cylohexane solutions of alpha-substituted benzenes (methyl-ethyl-,propyl-, tertbutyl-)show increased IC rate constants as the number of beta-carbons is increased. The increase in the IC rate due to the perturbation of the solvent. The energy transfer rate was measured at two concentrations (inconclusive results) and as a function of excitation wavelength. The transfer rate changes by a factor of 2 to 3 across the inhomogeneous profile. Dissert. Abstr.

N80-34223 Rutgers - The State Univ., New Brunswick, N. J.
MOLECULAR BEAM CHEMILUMINESCENT INVESTIGATION OF THE INELASTIC COLLISIONS OF RARE GAS METASTABLE ATOMS Ph.D. Thesis
Joseph J. BelBruno 1980 275 p
Avail: Univ. Microfilms Order No. 8022542

A nozzle beam scattering cell arrangement was utilized with optical analysis of the emission from the excited products to study electronic energy transfer between rare gas metastable and small molecules. Spectra were recorded and analyzed in a determination of the dependence of vibrational population, on the average relative kinetic energy. Experiments were performed for three types of processes, including collisional dissociation of the scattering gas. Penning ionization and electronic energy transfer. Results were compared to observed electron impart spectra as well as predicted data from phase space, golden rule and ionic intermediate curve crossing models. Neutral excitation collisions between argon and nitrogen produced the first positive and second positive nitrogen emissions. Excitation transfer from xenon to nitrogen populated vibrational levels of the B state of nitrogen according to a nonFranck-Condon distribution.
Dissert. Abstr.

N80-34224 California Univ., Los Angeles.
HOMOGENEOUS VAPOR PHASE NUCLEATION OF LARGE POLAR MOLECULES UNDER LIMITING EXPERIMENTAL CONDITIONS: HIGH TEMPERATURES, LOW PRESSURES, AND LONG GROWTH TIMES Ph.D. Thesis
Carol Becker 1980 163 p
Avail: Univ. Microfilms Order No. 8023273

A diffusion cloud chamber was used to investigate involatile stearic acid molecule which requires high temperatures and low pressures. To determine whether cloud chamber experiments are feasible under these conditions, three prerequisite studies were conducted: (1) nucleation in a nonuniform vapor; (2) droplet growth in a nonuniform vapor, and (3) homogeneous nucleation of lambda-menthol. Measured critical supersaturations were compared with the predictions of the classical Becker-Doering theory for monomeric stearic acid. This comparison indicates a definite discrepancy between theory and experiment. The experimental envelope lies 27% above the theory at the lowest temperature and 10% below the theory at the highest temperature. Calculations show that part of the increase in experimental critical supersaturation at the lower temperatures could be due to association in the vapor. Dissert. Abstr.

N80-34225 Miami Univ., Coral Gables, Fla.
LOCALIZED ATOMIC ORBITALS FOR ATOMS IN MOLECULES Ph.D. Thesis
Keith Harlan Aulderheide 1980 225 p
Avail: Univ. Microfilms Order No. 8023658

A method is devised for the construction of localized atomic orbitals (LAOs) for atoms in molecules. The procedure involves definition of a function, L(Aa,Aa bar), a measure of a particular variety of exchange energy associated with the distribution between AOs a and a bar on atom A. The terms L(Aa) = L(Aa,Aa) constitute an atomic localization sum., L(A), which is required to be a maximum in the LAO basis on A. The properties of the components of L(A) are explored so as to achieve greatest computational efficiency. The maximization process is contingent upon an iterative sequence of 2 x 2 rotations. For the molecules tested, LAOs partition into sets of core, bonding, and lone pair orbitals, thereby lending a rigorous quantum mechanical interpretation to classical and pseudo-classical notions of atomic hybridization. LAOs are found to be extremely transferable among similar systems which allows for the development of generalized LAOs to account for average hybridization of many chemically important systems. The Mulliken populations of LAOs correspond quite closely to classical concepts. Finally, LAO studies of the barrier to internal rotation in ethane are discussed.
Dissert. Abstr.

N80-34226 Colorado Univ. at Boulder.
EXPERIMENTAL ELECTRON-IMPACT EXCITATION AND IONIZATION OF POSITIVE IONS Ph.D. Thesis
Wade Thomas Rogers 1980 302 p
Avail: Univ. Microfilms Order No. 8021628

Absolute cross sections were measured, using crossed beams of electrons and ions, for excitation and ionization processes. For excitation measurements the photons resulting from the decay of the ions were detected, whereas for the ionization experiments the production of doubly charged ions was monitored. The cross sections were made absolute by direct calibration of the detectors against appropriate optical or electrical standards. Numerous possible systematic effects were studied, and the cross sections were demonstrated to have the correct functional dependence on experimentally measurable quantities. The quality and quantity of the data made possible the determination of near threshold structure in all measured cross sections except in the case of the GaII resonance line excitation, where the data were insufficient for this purpose. Dissert. Abstr.

N80-34227 Wayne State Univ., Detroit, Mich.
TOTAL AND DIFFERENTIAL SCATTERING CROSS SECTION MEASUREMENTS FOR POSITRONS AND ELECTRONS COLLIDING WITH INERT GASES Ph.D. Thesis
Munir Sweilem Dababneh 1980 121 p
Avail: Univ. Microfilms Order No. 8022743

Total scattering cross sections were measured in the same apparatus for low and intermediate energy positrons and electrons colliding with krypton and xenon using a beam transmission technique. The low energy positron measurements reveal a sudden increase in the cross sections in the vicinity of 7 eV and 5eV for krypton and xenon respectively. The intermediate krypton measurements show a continuous decrease in the two cross sections from the maxima at about 10 eV and 30 eV for electrons and positrons respectively. There is an indication of a gradual approach of the electron and positron scattering cross section at higher energies. The intermediate energy positron- and electron-xenon measurements show a continuous decrease in the cross section above 40 eV and 10 eV respectively. A sharper decrease was observed for electron-xenon scattering measurements where the cross sections drop below the positron scattering cross sections between 40 eV and 90 eV. The two curves diverge above 100 eV and seem to be converging again at about 500 eV.

Preliminary differential scattering cross section measurements at 90 deg were made for low energy electrons colliding with helium and argon. Dissert. Abstr.

N80-34228 Cornell Univ., Ithaca, N. Y.
DIGITAL IMAGE PROCESSING OF CONVENTIONAL TRANSMISSION ELECTRON MICROGRAPHS Ph.D. Thesis
Earl John Kirkland 1980 101 p
Avail: Univ. Microfilms Order No. 8020838

The theory of bright field image formation of thin specimens in a conventional transmission electron microscope is presented. The recorded image contrast is shown to be predominantly linear in the electron atom scattering amplitudes which are in general complex (possessing phase and amplitude). A linearized image model including multiple images of varying defocus is derived. Image degradation is characterized by an instrumental transfer function and by a Debye-Waller temperature factor representing the thermal vibration of the atoms in the specimen. Using the minimum mean square error criterion, a method of image reconstruction to recover the real and imaginary parts of the ideal phase contrast image from a defocus series is derived. The effects of a finite signal to noise ratio are included. This method of image reconstruction reduces to the well known Wiener filter in the appropriate limiting conditions and is shown to work in both theory and practice. A theoretical phase grating calculation of a hypothetical specimen is used to simulate a defocus series which is subsequently processed with the image reconstruction procedure. Results from experimental defocus series are also discussed. Dissert. Abstr.

N80-34229 North Carolina Univ. at Chapel Hill.
ATOMIC EFFECTS IN NUCLEAR REACTIONS Ph.D. Thesis
James Marshall Feagin 1980 146 p
Avail: Univ. Microfilms Order No. 8022450

The dependence of nuclear reaction observables on excitation of the surrounding atom is developed. Considerations are confined to those excitations of the atomic electrons arising from changes in the nuclear charge and velocity as a result of the nuclear reaction. The analysis is divided into two parts. In the first, a general time-dependent semiclassical formalism of atomic excitation as a result of a nuclear reaction is derived and sum rules for the moments of the electron excitation energy distribution are obtained. Procedures for modifying nuclear reaction observables by atomic transition amplitudes and energies are applied to calculate atomic corrections to Q values in Beta(+) decay. In the second part, a time independent R matrix theory is developed and the dependence on atomic excitation of quantities characterizing a nuclear reaction is derived. The R matrix formalism, generalized to include atomic excitation, retains all the utility of the usual nuclear R matrix theory. Dissert. Abstr.

N80-34230 Cornell Univ., Ithaca, N. Y.
COLLECTIVE ACCELERATION OF IONS IN VACUUM Ph.D. Thesis
Richard John Adler 1980 412 p
Avail: Univ. Microfilms Order No. 8020788

Ion acceleration produced by interaction of an intense electron beam with a localized ion source was studied. Two distinct types of ion sources were used: a dielectric (polyethlene) anode which produced protons, and a metal foil anode which produced both protons and the anode foil ion specie. The measured quantities included beam current, propagated electron energy, anode current, the ion energy spectrum, RF oscillations, and the ion angular distribution, among others. A Faraday cup which measured the time resolved proton energy spectrum was developed. The high energy ions were recorded late (60-100 nanoseconds) in the 100 nanosecond beam pulse, precluding ion production by a beam front mechanism. A summary of relevant theory was also presented, including a momentum transfer analysis which correctly accounts for the acceleration of the bulk of the ions (E < 2 MeV). Aluminum and iron ions were accelerated from metal foils to up to 50 times the electron energy (for Iron).
Dissert. Abstr.

N80-34231 City Univ. of New York, N. Y.
EFFECTS OF HEAVY PARTICLES AT LOW ENERGIES Ph.D. Thesis
Aleksandar Sokorac 1980 87 p
Avail: Univ. Microfilms Order No. 8023734

The low-energy effects of heavy particles are discussed in the context of the quantum field theories with local gauge invariance and in general. The evaluation of the one-loop heavy particle contribution to a low-energy relation valid in the SU(5)grand unified theory is presented. The calculation shows that heavy particles decouple (i.e. have negligible effect) in agreement with the decoupling theorem but proved only in a simple gauge model with one mass scale. The decoupling theorem is confronted with the recent counterexamples in literature and their difference with grand unified theories is stressed. The more precise version of the decoupling theorem valid in a general case is proposed. As a byproduct of the calculation, the heavy particle contribution to sin (2)theta in the SU(5) theory is obtained which together with the existing light-particle calculation agrees with the result obtained by the renomalization-group method and assuming the validity of the decoupling theorem.
Dissert. Abstr.

N80-34232 Duke Univ., Durham, N. C.
INCLUSIVE STUDY OF 200 GeV/C PI-NEON INTERACTIONS Ph.D. Thesis
Band Henry Reyer 1980 149 p
Avail: Univ. Microfilms Order No. 8022210

Some 200 GeV/c pi-neon interactions were studied in the Fermilab 30 inch bubble chamber which was filled with a neon-hydrogen mixture (31 molar % neon). Scan results and measurements of a representative event sample yielded proton, gamma and pion multiplicities and single particle spectra. Nearly identical to lower energy measurements, R is strongly dependent on the number of observed protons in the event. The KNO scaling was observed for the corrected multiplicity distributions. Scaling was violated if events with a fixed number of protons were considered. Study of the pion single particle spectra showed the excess particle production of the neon target over that of hydrogen was largest in the target fragmentation region and nearly constant in the central production region. The dependence of the pion rapidity distribution on the number of protons was consistent with collisions on either one or two nucleons. Dissert. Abstr.

N80-34233 North Carolina Univ. at Chapel Hill.
CONTINUOUS IRRADIATION METHODS FOR NUCLEAR RESONANCE LINE-NARROWING Ph.D. Thesis
John Wood Poulton 1980 213 p
Avail: Univ. Microfilms Order No. 8022497

Several methods of reduction of the nuclear magnetic spectroscopic line widths in solids were investigated. These methods involved the application of sequences of long pulses of RF irradiation. The simple theory for continuous irradiation experiments was also reviewed in order to understand the methods in the simplest possible terms. A more satisfactory method was examined which took into account various experimental difficulties and which more accurately described the internal interactions of the spin system. Dissert. Abstr.

N80-34234*# IRT Corp., San Diego, Calif.
LOW ENERGY ATOMIC COLLISIONS
R. H. Neynaber and S. Y. Tang 30 Apr. 1980 8 p refs
(Contract F49620-78-C-0015; AF Proj. 9767)
(AD-A088748; IRT-8173-009; AFOSR-80-0683TR) Avail: NTIS HC A02/MF A01 CSCL 20/7

A summary of research performed under AFOSR contract no. F49620-78-C-0015 is given. The contract covered the period 1 October 1977 - 30 April 1980. The report describes merging-beams studies of chemi-ionization and/or ion-molecule reactions. Included are investigations of the He^*-D, Ne^*-Xe, He^*-He^*, Ar^*-Kr^*, Ne^*-Ar^*, He^*-Ne^*, and He(-)-Ne^* systems.
GRA

N80-34235*# Washington Univ., Seattle. Dept. of Chemistry.
HIGH TEMPERATURE GAS ENERGY TRANSFER Annual Summary Report, 1 Aug. 1979 - 31 Jul. 1980
B. S. Rabinovitch 12 Aug. 1980 15 p refs
(Contract N00014-75-C-0690)
(AD-A089129) Avail: NTIS HC A02/MF A01 CSCL 07/4

Work under this contract is summarized. Results are described on collisional transfer of vibrational energy by a variety of gases on the temperature dependence of transfer efficiency. A novel and simple Variable Encounter Method has been applied to the study of energy transfer between gas molecules and a wall, at high temperatures and high levels of activation, in the transient region. Results by the Diffusion Cloud Method are also described. GRA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N80-34236 California Univ., Los Angeles.
HIGH-ENERGY PROTON-PROTON ELASTIC SCATTERING Ph.D. Thesis
Yiharn Tzeng 1980 120 p
Avail: Univ. Microfilms Order No. 8023376

High energy proton-proton elastic scattering via the quark model and Glauber approximation was studied. The quark's color and spin effects in pp scattering were studied. A color-dependent quark-quark scattering amplitude and a color and spin-dependent one were first obtained from assumed potentials. The pp scattering amplitude was then derived from these quark-quark amplitudes. Calculations were done up to the fourth order of the multiple scattering terms with Gaussian form factor in the spin-independent case and to the third order with both Gaussian and modified dipole form factors in the spin-dependent case. Examples of numerical results are given to show the characteristics of the model. Dissert. Abstr.

N80-34237# Naval Research Lab., Washington, D. C. Plasma Physics Div.
STEADY STATE TREATMENT OF RELATIVISTIC ELECTRON BEAM EROSION Interim Report
William M. Sharp (Science Application, Inc., McLean, Va.) and Martin Lampe 3 Sep. 1980 67 p refs
(ARPA Order 3718)
(AD-A089047; NRL-MR-4315) Avail: NTIS HC A04/MF A01 CSCL 20/8

The head of a relativistic electron beam propagating into un-ionized or weakly ionized gas is not self-pinched and expands freely, causing the beam to take on a 'trumpet' shape. The region where the beam pinches, referred to as the 'pinch point', moves steadily back into the beam because of the reduced ionization rate at the expanding beam head and energy loss to the induced electric field. This beam head 'erosion' is modeled by assuming that the axial beam profile is stationary in a reference frame moving with the pinch point. This assumption allows the beam equations to be written in time-independent form, and radial averaging then yields a set of one dimensional ordinary differential equations for the beam radius and energy, the mean pinch force, and the background conductivity. Solution of these equations with appropriate boundary conditions gives both the erosion rate and the beam axial structure. Results of extensive numerical calculations are presented, along with analytic estimates of the erosion rate, degree of current neutralization, and axial scale lengths. GRA

N80-34238# Missouri Univ. -Kansas City. Dept. of Chemistry.
CONSTRUCTION AND TESTING OF AN ION PHOTOFRAGMENT MOMENTUM SPECTROMETER Final Report, 1 Jun. 1979 - 1 Jun. 1980
Timothy F. Thomas 29 Jul. 1980 18 p refs
(Contract F49620-79-C-0167; AF Proj. 2303)
(AD-A088753; AFOSR-80-0696TR) Avail: NTIS HC A02/MF A01 CSCL 20/7

A nuclide 12-90-G mass spectrometer has been modified for potential use as an ion photofragment momentum spectrometer. It is demonstrated to have the capability of resolving vibrational structure in the momentum distribution of NO(-) produced by photodissociation of N2O(-) with a detector slit width of 0.25 mm. At this slit width an ion current of 5 picoamps of Ar(-) at the detector is achievable. The operating parameters of the 3 diaphragm single lens used to generate the primary ion beam are presented in detail. GRA

N80-34239# Sandia Labs., Albuquerque, N. Mex. Pulsed Power System Dept.
PULSED POWER ACCELERATORS FOR PARTICLE BEAM FUSION
T. H. Martin, G. W. Barr, J. P. VanDevender, R. A. White, and D. L. Johnson 1980 5 p refs Presented at the 14th Pulse Power Modulator Symp., Orlando, Fla., 3 Jun. 1980
(Contract DE-AC04-76DP-00789)
(SAND-80-0550C; CONF-800640-12) Avail: NTIS HC A02/MF A01

Sandia National Laboratories is completing the construction phase of the Particle Beam Fusion Accelerator-1 (PBFA-1). Testing of the 36 module, 30 TW, 1 MJ output accelerator is in the initial stages. The 4 MJ, PBFA Marx generator provided 3.6 MA into water-copper sulfate load resistors with a spread from first to last Marx firing between 15 to 25 ns and an output power of 5.7 TW. This accelerator is a modular, lower voltage, pulsed power device that is capable of scaling to power levels exceeding 100 TW. The elements of the PBFA technology and their integration into an accelerator system for particle beam fusion is discussed. DOE

N80-34240# California Univ., Livermore. Lawrence Livermore Lab.
INTRODUCTION TO MAGNETIC CONFINEMENT FUSION DIAGNOSTICS
W. C. Turner 6 Jun. 1980 47 p refs Presented at the IEEE Mini-Course on Modern Plasma Diagnostics, Madison, Wis., 21-23 May 1980
(Contract W-7405-eng-48)
(UCID-18704) Avail: NTIS HC A03/MF A01

A brief survey of some of the current diagnostic techniques used in magnetic fusion plasma devices is presented. The range of parameters and geometries encountered the parameters of four representative experiments, PLT, TMX, ZT-40 and EBT-I(S), are given. The flow of power which can be summarized by two volume integrated equations for the ions and electrons is discussed. DOE

74 OPTICS

Includes light phenomena.

N80-34241 Environmental Research Inst. of Michigan, Ann Arbor.
MEETING OF THE IRIS SPECIALTY GROUP ON INFRARED DETECTORS, VOLUME 1
Infrared Information and Analysis Center. Oct. 1979 423 p refs Meeting held at Minneapolis, 12-13 Jun. 1979
(Contract N00014-77-C-0125; NR Proj. 315-001)
(ERIM-139600-3-X(I)) Avail: Issuing Activity

The current status of infrared detector technology and development is presented. Limitations for infrared extrinsic and intrinsic photodetectors are discussed. Performance of silicon based photodiodes is discussed. The fabrication of photodiodes and photodetector arrays is described. T.M.

N80-34242 British Library Lending Div., Boston Spa (England).
A METHOD OF MEASURING THE VISIBILITY OF MILITARY OBJECTS
J. Boogaard and A. Meeteren 28 Nov. 1979 18 p refs Transl. into ENGLISH of "Een Methodeom de Opvallendheid van Militaire Objekten to Meten" Rept. IZF-1978-10 Netherlands Organization for Applied Scientific Research TNO., Inst. of Perceptual Physiology, Soesterberg
(RAE-Lib-Trans-1981(5207); IZF-1978-10) Avail: British Library Lending Div., Boston Spa, England

A simple method of determining the visibility of military objects is described. Taking photographs in the field and then determining indoors the simulated detection distances is demon-

strated for vehicle type YA 2442 and YA 126, with and without trailer. The YA 126 would seem to be the less conspicuous under all circumstances, both with and without the trailer. S.F.

N80-34243 British Library Lending Div., Boston Spa (England).
DETERMINATION OF SURFACE ACTIVE MATERIALS BY SQUARE-WAVE POLAROGRAPHY (POLAROGRAPHY WITH RECTANGULAR WAVE)
Maria Porubska Feb. 1980 9 p refs Transl. into ENGLISH from Chem. Prum. (Prague), v. 29, No. 1, 1979 p 38-40
(BLL-RTS-12170) Avail: British Library Lending Div., Boston Spa, England

The possibility of the application of tensametry for the determination of surfactants was examined. The behavior of several auxiliary materials in the plastics industry using ac polarography (alternating current polarography) was studied. Surface active material tensides were determined by classical polarography (dc polarography) indirectly on the basis of the drop in the oxygen maximum. The behavior of three preparations, recommended for antistatic treatment of plastics, was examined: anion-active, cation-active and a nonionic tenside. The conditions governing their determination by square wave polarography were determined. T.M.

N80-34244 Portland State Univ., Oreg.
SELECTIVE REFLECTION OF LIGHT AT A SOLID-GAS INTERFACE AND ITS APPLICATION Ph.D. Thesis
Fumihide Takeda 1980 191 p
Avail: Univ. Microfilms Order No. 8021964

In order investigate the feasibility of techniques for obtaining solid gas molecule interaction potentials, models of solid gas interfaces were studied. A marked difference in the line shapes of the reflected light among the possible interactions suggests that the forms of interaction at the interface can be measured using known techniques. The possibility of measuring the flow of gas near walls where currently available laser Doppler anemometers can not spatially reach was investigated. The shift and width of the numerically calculated line shape of the reflected light in model flow is directly related to the mean and the fluctuating velocity fields respectively. Dissert. Abstr.

N80-34245 Texas Univ. at Austin.
THREE WAVE NONLINEAR INTERACTIONS IN DISPERSIVE MEDIA Ph.D. Thesis
Sulaksh Rashmikant Gautam 1980 107 p
Avail: Univ. Microfilms Order No. 8021436

Three wave interactions in homogenous nonlinear dispersive media are studied with a complementary use of analytic and numerical methods. The effects of dispersion in the picosecond substructure generation in optical parametric processes are investigated. In a 3-wave interaction at optical frequencies omega sub 1, omega sub 2, omega sub 3 satisfying the resonance condition (i.e., omega sub 3 = omega sub 1 + omega sub 2), the presence of dispersion in the medium leads to the generation of picosecond multipulsed substructure in the pulse profiles. Both, the degenerate (omega sub 1 = omega sub 2 = (omega sub 3)/2 as well as the nondegenerate omega sub 1 does not equal omega sub 2 parametric amplification processes are studied. For all cases, a specific and realistic situation involving a LiNbO3 crystal illuminated by pulsed laser is considered. The time envelope of the initial pulses is chosen to be Gaussian with a full width at the half maximum of 30 psecs. The existence of the picosecond substructure in the pulse profiles is in good agreement with the experimental observations. Experiments are proposed for the generation and detection of such picosecond substructures.
Dissert. Abstr.

N80-34246 Miami Univ., Coral Gables, Fla.
NON-PROJECTIVE TRANSFORMATIONS IN OPTICS Ph.D. Thesis
Dean Francis Cornwell 1980 420 p
Avail: Univ. Microfilms Order No. 8022877

Optical systems that perform nonprojective transformations are rarely synthesized by intent. Most systems familiar in practice are designed to provide the closest approximation to a projective transformation that is allowed by physics, technology, or economy. The advent of the laser brings many new applications for optical transformations - the nonprojective variety being a late-comer. Requirements in the fields of laser materials processing, optical data processing, high energy lasers, and laser fusion, just to name those areas already penetrated, evoke consideration for unconventional grooming of wavefront irradiance profiles. Transformations such as changing a wavefront irradiance distribution from flat like to Gaussian-like or vice versa, or changing the wavefront area obscuration while maintaining its focusability are typical examples of applications gaining an increasing interest. Following the laws of geometrical optics, but violating many of its precepts, principles of design and analysis of nonprojective transformations in optics, and several of the potential applications are explored. Dissert. Abstr.

N80-34247 Arizona Univ., Tucson.
GENERALIZED RAY TRACING, GENERALIZED BENDING AND USE OF CAUSTIC SURFACES AS MERIT FUNCTIONS IN OPTICAL DESIGN Ph.D. Thesis
Rong Seng Chang 1980 105 p
Avail: Univ. Microfilms Order No. 8022831

Characteristics of generalized bending are discussed. The displacement of a caustic point caused by a generalized bending is in essentially a straight line. The direction of the displacement is determined by which refracting surfaces are selected. The magnitude of the displacement is proportional to the logarithm of the bending parameter. Caustic surfaces can be used as a merit function in the optical process. The merit functions can be calculated by means of generalized ray tracing. Generalized bending provides an effective means of optimizing the design of an optical system when included in a feedback loop.
Dissert. Abstr.

N80-34248 City Univ. of New York, N. Y.
SOME ASPECTS OF THE NONLINEAR INTERACTION OF LIGHT AND MATTER Ph.D. Thesis
Milivoj Radivoj Belic 1980 158 p
Avail: Univ. Microfilms Order No. 8023688

Various aspects of the interaction of light with matter are addressed. The competition between self-phase modulation and stimulated Raman scattering is examined. A realistic model for the unstable loaded optical resonator in the paraxial wave approximation is then discussed. The possibility of utilizing optical power to directly drive a refrigerator is explored. Finally, the nature of the energy band structure of solids in an external laser field is investigated. Dissert. Abstr.

N80-34249 Duke Univ., Durham, N. C.
AN IMPROVED SIX-PORT TECHNIQUE FOR MEASURING COMPLEX REFLECTION COEFFICIENT Ph.D. Thesis
Marc David Rafal 1980 78 p
Avail: Univ. Microfilms Order No. 8022860

Current realizations of the Six-Port technique for measuring the complex reflection coefficient require accurate information about the system calibration constants. An examination of the sensitivity of the solution of the reflection coefficient to calibration constants is undertaken. An improved set of design specifications is derived based on the sensitivity of the solution and constraints on power measurement accuracy. It has been recognized that the system equations for the Six-Port are an overdetermined set of equations. Previously, this overdeterminedness has not been used to reduce the sensitivity of the solution of the reflection coefficient to variation of the calibration constants. An algorithm is described which makes use of the extra calibration constants. A Fortran program is presented which implements the algorithm. A hardware realization based on the improved set of design specifications is described. The circuit operates at a center frequency of 900 MHz and performs over a 16% band of frequencies without recalibration. Errors in phase measurement for this Six-Port implementation are less than two degrees except at the band edges. Errors in magnitude measurement are less than 10% except for measurements of small values of reflection coefficient magnitude (0.3) for which errors are 20%.
Dissert. Abstr.

N80-34250*# National Aeronautics and Space Administration. Pasadena Office, Calif.
A FIBER OPTIC TRANSMISSION LINE STABILIZATION APPARATUS AND METHOD Patent Application
George F. Lutes (JPL) and Kam Y. Lau, inventors (to NASA)

(JPL) Filed 17 Sep. 1980 31 p
(Contract NAS7-100)
(NASA-Case-NPO-15036-1; US-Patent-Appl-SN-188160) Avail: NTIS HC A03/MF A01 CSCL 20F

A reference signal of RF frequency modulates .85 micrometer wavelength optical transmitter whose output passes through an optical filter and a voltage controller phase shifter such that the output of the phase shifter is provided to the fiber optic transmission line. At the receiving end of the fiber optic transmission line, the signal is demodulated and used to modulate a 1.06 micrometer optical transmitter. The output signal from the 1.06 micrometer optical transmitter is provided to the same fiber optic transmission line and passes through the voltage controlled phase shifter to a phase error detector. The phase of the modulation of the 1.06 micrometer wavelength signal is compared to the phase of the reference signal by the phase error detector which provides a phase control signal related to the phase difference. This control signal is provided to the voltage controlled phase shifter which alters the phase of both optical signals passing through until a predetermined phase relationship between modulation on the 1.06 micrometer signal and the reference signal is obtained. NASA

N80-34251*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
COLLIMATED BEAM MANIFOLD AND METHOD FOR USING THE SAME Patent Application
C. Warren Campbell and Robert B. Owen, inventors (to NASA) Filed 15 Sep. 1980 15 p
(NASA-Case-MFS-25312-1; US-Patent-Appl-SN-187106) Avail: NTIS HC A02/MF A01 CSCL 20F

An optical manifold transforms a collimated beam, such as a laser beam, into a number of parallel beams having uniform intensity or having a desired intensity ratio. The manifold comprises an optical substrate coated on its rear surface with a fully reflective layer and on its front surface with a partially reflecting layer with a reflectivity gradient. An input collimated beam entering the rear surface and impinging on the front surface is multiplicatively reflected between the front and rear surfaces producing a number of parallel beams that emerge from the front surface. The intensities of the emerging beams have a relationship that depends on the reflectivity (R1, R2, R3, R4, and R5) of the front surface at the points where the beams emerge. By properly selecting the reflectivity gradients, the emerging beams will have uniform intensity or a desired intensity ratio. NASA

N80-34252# Naval Ocean Systems Center, San Diego, Calif.
DESIGN OF A FIBER OPTIC DATA LINK FOR THE GROUND LAUNCHED CRUISE MISSILE Final Report, Apr. 1979 - Dec. 1979
C. R. Hansen, T. P. Fitzgerald, and R. A. Greenwell 30 May 1980 25 p
(AD-A088847; NOSC/TR-557) Avail: NTIS HC A02/MF A01 CSCL 17/2

This report examines the feasibility of using fiber optic data links to connect the operating units of the Ground Launched Cruise Missile Weapons Control System. The conclusion is reached that the necessary technology to implement such a design is either presently available or will become available by mid-1980. GRA

N80-34253# Washington Univ., Seattle. Dept. of Electrical Engineering.
SYNTHESIS OF GENERALIZED COHERENT OPTICAL PROCESSOR Final Report, 1 Aug. 1975 - 30 Sep. 1978
F. Paul Carlston Aug. 1980 12 p refs
(Contract N00014-76-C-0522; NR Proj. 350-005)
(AD-A088669; UW-TR-220) Avail: NTIS HC A02/MF A01 CSCL 17/8

This final report gives a summary of all the work completed under this contract, covering the period from August 1975 to September 1978. The work covers a broad spectrum of activities, including generalized operator theory for coherent optical processors to specific realizations of processor elements and algorithms. The emphasis is directed towards generating new ideas to solve theoretical as well as practical problems. Success in our effort is evidenced by the list of reports and publications. GRA

N80-34254# Chicago Aerial Industries, Inc., Barrington, Ill.
ADVANCED ELECTRO-OPTICAL TRACKER/RANGER Final Report, Oct. 1978 - Feb. 1980
R. A. Bennett and D. N. DeFoe Jun. 1980 231 p
(Contract F33615-78-C-1562; AF Proj. 7629)
(AD-A089143; CAI-7323-0180-5; AFWAL-TR-80-1034) Avail: NTIS HC A11/MF A01 CSCL 17/8

The preliminary engineering design study of an Advanced Electro-Optical Tracker/Ranger (AEOTR) to provide passive target tracking and rangefinding for air to air gun fire control is described. Area correlation processing is used in the comparison of stereo image pairs for stereometric ranging and in the comparison of successive images for tracking. The application of these techniques to the AEOTR, the limitations imposed by packaging, environmental and state-of-the-art sensor and processing hardware constraints, and the projected performance are evaluated. Principal emphasis is given to the use of AEOTR in the gun director engagement mode in which target track and range data is provided to a gun fire control computer. The feasibility of use of the AEOTR to provide target video as an aid to visual target identification, and to provide automatic airborne target detection, is also evaluated. The necessary functions and subsystems are defined and integrated into a preliminary design, whose performance is estimated and compared with the program goals. In addition, a preliminary mounting location study for the F-15, F-16 and F-18 advanced fighters is included. CAI-built hardware was used to successfully demonstrate the feasibility of the ranging and tracking concepts employed in the AEOTR. GRA

N80-34255# Texas Technological Univ., Lubbock. Optical Sciences Lab.
ANALYSIS OF UNSTABLE OPTICAL RESONATORS Final Report, 1 Mar. 1977 - 31 Mar. 1979
John D. Reichert 9 Jun. 1980 24 p
(Grant AF-AFOSR-3278-77; AF Proj. 2301)
(AD-A088600; AFOSR-80-0624TR; TTOSL-FSR-2) Avail: NTIS HC A02/MF A01 CSCL 20/6

Four topics: general laser resonator theory, distributed reflection of light and damage to optical elements, oxide layer thickness on commercial ALCLAD, and multipass chemical laser power amplifiers are presented. Fundamental approaches, techniques, and results were developed and achieved in these areas. T.M.

N80-34256# National Bureau of Standards, Washington, D.C. National Measurement Lab.
PHOTOMETRY AND COLORIMETRY OF RETROREFLECTION: STATE-OF-MEASUREMENT-ACCURACY REPORT Final Report
Kenneth L. Eckerle Jul. 1980 47 p refs
(PB80-201783; NBS-TN-1125) Avail: NTIS HC A03/MF A01 CSCL 20F

A survey of the literature on retroflection and information from this survey necessary for the understanding of the phenomenon of retroreflection are summarized. Materials, measurement geometry, quantities to be measured, instrumentation, and methods of calibration are included. Recommendations are given to evaluate or to write specifications by discussing important parameters. A partial list of test methods and specifications is presented in tabular form. Some prior research and intercomparisons are summarized including the results. The state-of-measurement-accuracy is inferred from the information presented. A bibliography is included. GRA

N80-34257 City Univ. of New York, N. Y.
SOME ASPECTS OF THE NONLINEAR INTERACTION OF LIGHT AND MATTER Ph.D. Thesis
Milivoj Radivoj Belic 1980 158 p
Avail: Univ. Microfilms Order No. 8023888

Various aspects of the interaction of light with matter are explored. The competition between self phase modulation (SPM) and stimulated Raman scattering (SRS) is studied and a realistic model for the unstable loaded optical resonator in the paraxial wave approximation is reviewed. The possibility of utilizing optical power to directly drive a refrigerator is discussed along with the nature of the energy band structure of solids in an external laser field. Dissert. Abstr.

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N80-34258 Colorado Univ. at Boulder.
TWO EXAMPLES OF THE DECAY INSTABILITY IN AN INHOMOGENEOUS PLASMA Ph.D. Thesis
Terence Harvey Rudolph 1980 152 p
Avail: Univ. Microfilms Order No. 8021631

Saturation of the electron ion decay instability can occur linearly in an inhomogeneous plasma due to the effects of Langmuir wave propagation. The Langmuir intensity spectrum resulting from this convective saturation is calculated from the WKB wave kinetic equation in two cases: (1) an ionospheric model including magnetic field and cyclotron harmonic damping, and (2) a dense plasma focus model. An application is made to the scattering experiment of Peacock, et al. The addition of a term corresponding to nonlinear Landau damping is also considered. Dissert. Abstr.

N80-34259 City Univ. of New York, N. Y.
EXPERIMENTAL INVESTIGATION OF MODULATIONAL EFFECTS IN A MAGNETIZED PLASMA Ph.D. Thesis
Doowah Louie 1980 153 p
Avail: Univ. Microfilms Order No. 8023748

Pulsed microwaves of frequency 2.43 GHz with 6 ms in pulse width are launched parallel to the external magnetic field into a magnetized plasma in a mirror machine with mirror ratio of 1.27. The plasma is produced by the same microwave pulsed by the method of electron cyclotron resonance using hydrogen. When the hydrogen neutral pressure is about 2 to 3x0.000010 modulations on all signals were observed and were investigated. The modulation is attributed to a relaxation type oscillation in the plasma. Dissert. Abstr.

N80-34260 Iowa Univ., Iowa City.
LARGE ELECTROSTATIC POTENTIAL VARIATIONS IN LABORATORY PLASMAS Ph.D. Thesis
Peter Geoffrey Cookley 1980 147 p
Avail: Univ. Microfilms Order No. 8022007

Large electrostatic potential variations in the form of sheaths and double layers (both stationary and moving) were studied in laboratory plasmas. Filament discharge plasmas were generated in a multidipole soup pot and a triple plasma device where the electron density is varied from 1 to 500 x 10 to the seventh power cu cm and the electron temperature T sub e approximately 1 to 3 eV in argon and helium plasmas. Emitting, collecting and floating Langmuir probes were used to study the phenomena associated with large potential variations. The axial potential structure from a biased disc probe (-20 V) in a vacuum was measured with an emissive probe. The potential measured agreed with the potential predicted to within a factor of two. Dissert. Abstr.

N80-34261# California Univ., Los Angeles. Center for Plasma Physics and Fusion Engineering.
EFFECT OF ICRF HEATING ON SINGLE PARTICLE CONFINEMENT IN TOKAMAKS
K. W. Whang and G. J. Morales Mar. 1980 18 p refs
(Contract N00014-75-C-0476)
(AD-A088578; PPG-473) Avail: NTIS HC A02/MF A01 CSCL 18/1

The simultaneous effect of ion heating and spatial diffusion due to ICRF heating in Tokamak geometry is investigated from the single particle viewpoint. Transitions between passing and trapped trajectories are taken into account in the mapping equations. Specific results are given for typical experimental devices. Author

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N80-34262 British Library Lending Div., Boston Spa (England).
FIXATION OF Zn(II) IONS ON METAL OXIDE SURFACES
Takao Kaji, Noboru Yamazoe, and Tetsuro Seiyama May 1980 13 p refs Transl. into ENGLISH from Denki Kagaku (Tokyo), v. 46, no. 12, 1978 p 673-679 Presented at 44th Congr. on Electrochem., Fukoda, Apr. 1977
(BLL-RTS-12200) Avail: British Library Lending Div., Boston Spa, England

Various aspects of the characteristics and reactivity of hydroxyl groups present on the surface of metal oxides were studied. Using conventional chemical reactions, desorption through temperature increase, and spectroscopic methods, the reaction between metal oxide surface hydroxyl groups and various metal ions was investigated. Ion exchange processes in this connection were also studied. Metal oxide surfaces react with metal ions or metal complex ions to form a protective surface. Surface fixation of metal ions and the characteristics of these ions is described. T.M.

N80-34263 Georgetown Univ., Washington, D.C.
PHONON-INDUCED NONEQUILIBRIUM STATES IN SUPERCONDUCTING FILMS: A KINETIC EQUATION STUDY Ph.D. Thesis
Nicholas Christopher Cirillo, Jr. 1979 118 p
Avail: Univ. Microfilms Order No. 8021263

The effect of the injection of coherent longitudinal phonons into superconductors is investigated using the quasiparticle and phonon kinetic equations. Eliashberg suggested that the absorption of microwave electromagnetic radiation of energy by a superconducting film would increase the energy gap by redistributing the quasiparticles away from the gap edge. Tredwell and Jacobsen employed Eliashberg theory to predict phonon-induced increases in the energy gap. They obtained good agreement between the theoretical predictions and their experimental data for thin film samples and for low power absorption levels. The calculations also assume that the phonons emitted in the relaxation of the excited quasiparticles are not reabsorbed, and hence do not lead either to additional excitation of the quasiparticles or to the creation of new quasiparticles by pair breaking. Using the modified kinetic equations of Bardeen, Rickayzen, and Tewordt these approximations are avoided and the previously unexplained features of the experimental data are satisfactorily accounted for. Dissert. Abstr.

N80-34264 Case Western Reserve Univ., Cleveland, Ohio.
THE EPITAXIAL POLYMERIZATION OF (SN)x Ph.D. Thesis
Scott Edwin Rickert 1980 122 p
Avail: Univ. Microfilms Order No. 8021713

The combination of a substrate directed epitaxial crystallization followed by a surface controlled solid state polymerization was studied. This sequential orchestration of both solid state processes was termed epitaxial polymerization. The polymer chosen is a metallic conductor at room temperature, superconducting at 0.3 K, and still a macromolecule. That material is polythiazyl, better known simply as (SN)x. Disulfur dimitride (S2N2) was deposited from the vapor phase on cold single crystals of various monovalent alkali halides. The resultant epitaxic growth was in the form of thin single crystal platelets. The polymer was formed by allowing the coated substrate to warm above 0 C. Fourier transform infrared spectroscopy was initially employed to examine a possible relationship between polymorphic structure and band position. The study revealed that water reacted with (SN)x and produced chemical defects. Fibrous (SN)x was successfully obtained by depositing and polymerizing a dinner layer on top of a previously polymerized layer on an alkali halide. Dissert. Abstr.

N80-34265 California Inst. of Tech., Pasadena.
ION-BEAM-INDUCED MODIFICATIONS OF THIN FILM STRUCTURES AND FORMATION OF METASTABLE PHASES Ph.D. Thesis

Bor-Yeu Tsaur 1980 230 p
Avail: Univ. Microfilms Order No. 8019910

The influences of energetic ion bombardment on the composition and structure of thin film materials and the utilization of ion-beam-mixing techniques to produce compounds and alloys are reported. By bombarding through a thin transition-metal film deposited on a Si substrate, significant atomic mixing was observed near the metal-Si interface at dose levels of 10 to the 15th power sq/cm. he atomic mixing led to the formation of well-defined silicide phases. The ion-beam-mixing process was then utilized to investigate the production of nonequilibrium (or metastable) phases. A metastable silicide phase of a stoichiometry Pt2Si3 was obtained by heat treating a Si-rich amorphous Pt-Si alloy layer produced by ion-beam-mixing of thin PtSi (or Pt) films on Si. The metastable phase was found to exhibit a superconducting transition onset at about 4.2K and to become completely superconductive at temperature below 3.6K. To further investigate the production of metastable phases by ion-beam-mixing experiments were performed in the simple eutectic system of Au-Si. The mixing of thin deposited layers (multiple-layers) were investigated as a scheme for producing compounds or alloys of desirable compositions. Dissert. Abstr.

N80-34266 Clarkson Coll. of Technology, Potsdam, N.Y.
CRYSTALLIZATION UNDER NONUNIFORM CONDITIONS Ph.D. Thesis
C. Kumar 1980 157 p
Avail: Univ. Microfilms Order No. 8023221

The tendency of crystals to grow uniformly to maintain their habit is the characteristic feature of such growth. Classical crystal growth theory predicts that this uniform growth should break down when the growth reaches its Wilson-Frenkel limiting value locally. If the local supersaturation is known at the point of breakdown, as determined experimentally, the deposition coefficient can then be calculated directly avoiding the usual multiparameter fitting of growth data. An experimental technique employing an impinging jet was used in this study of crystal growth of MgSO47H2O from water. The radial onset of liquid inclusions about the jet stagnation point is believed to indicate local Wilson-Frenkel growth. The deposition coefficient C is then determined from C = G/ sigma sub 0 min, where G is from transport modelling. The results are encouraging enough to recommend further intensive study. Dissert. Abstr.

N80-34267# Utah Univ., Salt Lake City. Dept. of Materials Science and Engineering.
POSITRON ANNIHILATION GAMMA RAY LINESHAPE STUDIES OF DEFECTS IN SOLIDS Final Technical Report, 1 Apr. 1975 - 31 Mar. 1980
J. G. Byrne 24 Jun. 1980 64 p refs
(Grant AF-AFOSR-2810-75)
(AD-A088856; UTEC-80-092; AFOSR-80-0700TR) Avail: NTIS HC A04/MF A01 CSCL 11/6

Positron annihilation measurements, performed via Doppler broadening of the annihilation gamma photon energy distributions, have been effectively applied to follow age hardening, hydrogen embrittlement, dislocation generation during single crystal bending, phase transformations in steel, deformation of both samples containing precipitates and preprecipitates and the deformation of steel. The technique is nondestructive and sensitive to line and point defects, interfaces, and microvoids. GRA

N80-34268# Hughes Research Labs., Malibu, Calif.
ION IMPLANTATION OF WIDE BANDGAP SEMICONDUCTORS Final Report, 15 Dec. 1978 - 14 Dec. 1979
K. V. Vaidyanathan, C. L. Anderson, H. L. Dunlap, and R. A. Jullens May 1980 49 p refs
(Contract N00173-73-C-0028)
(AD-A089026) Avail: NTIS HC A03/MF A01 CSCL 07/4

The primary objectives of this program are to study the electrical properties and carrier distributions in ion-implanted and annealed GaAs and to demonstrate the feasibility of forming planar, isolated p-n junctions by sequential implantation of donors and acceptors into semi-insulating GaAs. To fabricate such planar junctions, a selective area implantation process technology was developed. The required device isolation was achieved by exploiting the semi-insulating nature of Cr-doped GaAs. GRA

N80-34269# Honeywell Corporate Material Sciences Center, Bloomington, Minn.
STUDIES OF INDIUM-DOPED SILICON Final Report, 1 Aug. 1977 - 31 Oct. 1979
C. E. Jones, D. E. Schafer, M. W. Scott, and R. J. Hager Jun. 1980 130 p refs
(Contract DAAK70-77-C-0194; ARPA Order 3211)
(AD-A088736; HONEYWELL-41696) Avail: NTIS HC A07/MF A01 CSCL 17/5

Areas of current interest in infrared detector development include the development of larger arrays, the use of cheaper materials, and the integration of the detectors and processing electronics onto the same chip. Silicon doped with various impurities can be used as a photodetector in many regions of the infrared. Silicon is available in large areas and the technology and equipment needed to process the detectors and coupled electronics is that used in the current silicon electronics industry. Because of this, the production of chips with integrated detectors and electronics would be cheaper with silicon than with any other material. The yields, uniformity, and quality of silicon devices might be expected to be better for silicon than for any other less highly developed material and the development time and cost should be much less. The specific aims of this study effort were three fold: (1) develop a new growth process which can produce better-quality indium-doped silicon than current Czochralski or float-zone techniques; (2) determine the origin of the X-center and if possible eliminate it, and (3) determine the trapping parameters of centers in indium-doped silicon. GRA

N80-34270# SRI International Corp., Menlo Park, Calif. Molecular Physics Lab.
THEORETICAL STUDY OF STATE-TO-STATE COLLISIONS Final Scientific Report, 1 May 1979 - 30 Apr. 1980
Albert P. Hickman and Roberta P. Saxon 23 Jun. 1980 139 p refs
(Contract F44620-75-C-0073; AF Proj. 2301)
(AD-A088746; SRI-MP-80-72; AFOSR-80-0682TR) Avail: NTIS HC A07/MF A01 CSCL 20/8

The probability of making transitions between specifically known molecular states by collision processes has been theoretically investigated. The following research areas have been studied: Collisions of Rydberg states of Na, Rb, and Xe with rare gas atoms and with molecules; calculations of potential curves, matrix elements, and photodissociation cross sections of CH-; and nonadiabatic collision processes between alkali atoms or rare gas metastables and diatomic molecules that lead to ion-pair formation. GRA

N80-34271# Colorado State Univ., Fort Collins. Dept. of Chemistry.
OPTICAL AND MAGNETIC RESONANCE STUDIES OF ENERGY TRANSFER IN INORGANIC MOLECULAR SOLIDS Final Report, 1 Jun. 1977 - 31 May 1980
Elliot R. Bernstein Aug. 1980 4 p refs
(Grant DAAG29-77-G-0133)
(AD-A088567; ARO-16771.3-C) Avail: NTIS HC A02/MF A01 CSCL 07/4

The Jahn Teller Effect in iridium hexafluoride (IrF6) was studied. Three of the degenerate electronic states of IrF6 by absorption and Raman scattering studies of low temperature crystals were analyzed to determine linear and quadratic vibronic coupling parameters. A theoretical analysis of the energy levels of IrF6 was performed. Electron paramagnetic resonance data were analyzed for an octahedral state. Such a state, even in a cubic environment, evidences anisotropic behavior and highly complicated magnetic resonance spectra. R.K.G.

N80-34272# National Bureau of Standards, Washington, D.C. National Measurement Lab.
ACCURACY IN POWDER DIFFRACTION: PROCEEDINGS OF A SYMPOSIUM Final Report
S. Block, ed. and C. R. Hubbard, ed. Feb. 1980 557 p refs
Conf. held at Gaithersburg, Md., 11-15 Jun. 1979 Sponsored in part by International Union of Cryst. and National Council of Canada
(PB80-200488; NBS-SP-567; LC-80-600010) Avail: NTIS HC A24/MF A01 CSCL 20B

Total pattern, instrumentation and automation, profile fitting,

analysis of peak shape, lattice parameters and indexing, applications, and future opportunities in powder diffraction are discussed. GRA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

N80-34273 Princeton Univ., N. J.
INSTANTONS AND FERMION DENSITIES Ph.D. Thesis
Carlos Alberto AragaodeCarvalho 1980 73 p
Avail: Univ. Microfilms Order No. 8022813

The effects of imposing a fixed charge density constraint on field theories that possess instanton like classical solutions are discussed. The two dimensional Abelian Higgs model and the role played by the chemical potential (microns) of massless fermions in a dilute gas approximation to the functional integral are studied. Mass generation is discussed and a suppression of vortex density is shown to occur as we increase microns. In a one instanton amplitude for a fixed micron the instanton density is exponentially suppressed in both the heavy and high quark cases, a phenomenon due to screening. In the massless limit instantons should be completely suppressed and only virtual tunnelings (instanton-anti-instanton pairs) should be important. Dissert. Abstr.

N80-34274 State Univ. of New York at Stony Brook.
SELECTED STUDIES IN CLASSICAL AND QUANTUM FIELD THEORY Ph.D. Thesis
Ratindranath Akhoury 1980 125 p
Avail: Univ. Microfilms Order No. 8021376

This thesis is based on studies of: (1) magnetic monopole solutions in nonAbelian gauge field theories; (2) mass divergences of wide angle scattering amplitudes in renormalizable quantum field theories; and (3) pion condensation in nuclear and neutron matter. The Bogomolnyi equation for linear perturbations of the Prasad-Sommerfield monopole is solved exactly. Explicit expressions for all the normalizable and nonnormalizable nongauge modes are the translational modes. Open questions and possible applications are mentioned. The mass divergences of wide angle scattering amplitudes are examined in a class of field theories including those with elementary vector fields. Power counting arguments are used to show that, apart from renormalization effects, the wide angle gauge singlet scattering amplitude has a well defined zero mass limit and hence satisfies the renormalization group equations. The threshold for pionic instabilities in nuclear and neutron matter is studied in a temperature dependent formalism. It is found that in both systems such instabilities persist up to quite high temperatures, although the question about the magnitude of the condensate field strength at high temperature remains open. Dissert. Abstr.

N80-34275 Wayne State Univ., Detroit, Mich.
QUANTUM FIELD-THEORETICAL ELECTROMAGNETIC AND GRAVITATIONAL TWO-PARTICLE POTENTIALS Ph.D. Thesis
Stanley F. Radford 1980 60 p
Avail: Univ. Microfilms Order No. 8022785

A procedure is described for the derivation of higher order two particle potentials in quantum field theory and it is used to obtain the fourth order electromagnetic and gravitational two particle potentials. Integrals are evaluated over four vector variables in a covariant manner, while in earlier treatments such integrals are usually converted to noncovariant forms. It is shown that in spite of the nonrenormalizability of the gravitational couplings by writing these couplings for n dimensional space time and employing the method of dimensional regularization it is possible to obtain the static gravitational potential, including a contribution from a diagram requiring renormalization, and to show that in the static limit all nonrenormalizable terms arising from one loop diagrams can be dropped. Moreover, calculations of multiple parameter integrals are reduced to elementary integrations in the static and long range approximations. The quantum field theoretical results are in complete agreement with the classical potentials. Dissert. Abstr.

N80-34276# Brown Univ., Providence, R. I. Lefschetz Center for Dynamical Systems.
CONSERVATION LAWS WITH DISSIPATION
C. M. Dafermos Jul. 1980 13 p refs
(Contracts N00014-76-C-0278; DAAG29-79-C-0161; Grant NSF MCS-79-05774)
(AD-A088762) Avail: NTIS HC A02/MF A01 CSCL 20/13

The conservation laws of isothermal, isentropic or adiabatic thermoelasticity, in all their standard variants (Lagrangean or Euclidean formulation, solids or fluids, one or several space dimensions, etc.), lead to systems of quasilinear hyperbolic equations. A feature of such systems in that the Cauchy problem does not have global smooth solutions, even when the initial data are very smooth, due to the formation of shock waves. However, global solutions exist in the class of functions of bounded variations. A dissipative mechanism may affect, in general, the asymptotic behavior as well as the smoothness of solutions. Ranked according to effectiveness, dissipative mechanisms may be classified into those which are so powerful as to smoothen out even rough initial data, always yielding smooth solutions; those that preserve the smoothness of smooth initial data but are incapable of smoothening rough initial data; those that preserve the smoothness of smooth and :small: initial data but cannot prevent the breaking of smooth waves of large amplitude; and those that are not capable to prevent even the breaking of smooth waves of small amplitude. GRA

N80-34277# Naval Research Lab., Orlando, Fla. Marine Technology Div.
FINITE ELEMENT MODELING OF THE COUPLED THERMAL AND MOMENTUM DIFFUSION EQUATIONS Interim Report
George A. Keramidas 20 Aug. 1980 45 p refs
(RR0230141)
(AD-A088668; NRL-MR-4310) Avail: NTIS HC A03/MF A01 CSCL 20/13

The objective of this study is to develop the basic equation for a finite element formulation which can be used for solving problems related to coupled thermomechanical behavior. The formulation is based on the introduction of a new quantity, defined as heat displacement which is related to temperature in the same manner as the mechanical displacement is related to strain. The introduction of such a quantity into the thermal equation leads to a form similar to the equation of motion, so that, the governing equation for heat conduction can be regarded as an equilibrium equation. GRA

N80-34278# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
WAVEFRONT DECONVOLUTION STUDIES Final Interim Report
Richard Barakat Griffiss AFB, N.Y. RADC May 1980 90 p refs
(Contract F30602-79-C-0018)
(AD-A088548; RADC-TR-80-154) Avail: NTIS HC A05/MF A01 CSCL 20/10

Wavefront deconvolution studies include: a numerically stable iterative method for the inversion of wavefront aberrations from measured point spread function data; optimum balanced wavefront aberrations for radially symmetric amplitude distributions; and application of filtered singular value decomposition to wavefront deconvolution. R.K.G.

N80-34279# Texas Univ., Austin. Center for Particle Theory.
FOUR LECTURES ON POINCARE GAUGE FIELD THEORY
Frederick W. Hehl (Cologne Univ., West Germany) Dec. 1979 30 p refs Presented at the Intern. School of Cosmology and Gravitation, Erice, Italy, May 1979
(Contract DE-AS05-76ER-03992; Grant NSF PHY-78-26592) (ORO-3992-280) Avail: NTIS HC A03/MF A01

The Poincare (inhomogeneous Lorentz) group underlies special relativity. A consistent formalism is developed to allow an appropriate gauging of the Poincare group. The physical laws

are formulated in terms of points, orthonormal tetrad frames, and components of the matter fields with respect to these frames. The laws are postulated to be gauge invariant under local Poincare transformations. This implies the existence of 4 translational gauge and 6 Lorentz gauge potentials and the coupling of the momentum current and the spin current of matter to these potentials, respectively. Thus, a path is led to a Riemann-Cartan spacetime carrying torsion and curvature, richer in structure than the space time of general relativity. The Riemann-Cartan space time is controlled by the two general gauge field equations, in which material momentum and spin act as sources. The general framework of the theory is summarized in a table. Options for picking a gauge field Lagrangian are discussed. A Lagrangian quadratic in torsion and curvature governing the propagation of gravitons and rotons is proposed. A suppression of the rotons leads back to general relativity. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N80-34280 Ohio State Univ., Columbus.
MANAGEMENT GUIDANCE FOR RESEARCH CLIMATE Ph.D. Thesis
Richard K. Thatcher 1980 162 p
Avail: Univ. Microfilms Order No. 8022356

Effective management, particularly that of contract research and development, is based on a solid understanding of both the business and research processes involved. One part of these processes is research climate. Climate refers to a set of attributes about the system and/or its subsystems perceived by those participating in the system. These perceptions are multidimensional, psychologically meaningful wholistic descriptions by which people characterize a system's events, practices, and procedures. Climate perceptions function as frames of reference that are used in attaining congruity between individual behavior and the system's processes. While climate is responsive to many things, it is management practices which play the most dramatic role in its development. Those individual or group characteristics already captured by the research organization that would segregate high groups from low climate groups are examined.
Dissert. Abstr.

N80-34281# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
A DESCRIPTIVE APPROACH TO MULTIPLE-CRITERIA DECISION MAKING
T. J. Stewart Nov. 1979 34 p refs
(CSIR-TWISK-128) Avail: NTIS HC A03/MF A01

Certain concepts from multivariate statistical analysis are applied to problems in multiple-criteria decision making. The aim of this approach is to identify basic relationships and conflicts between the available decision alternatives and between criteria. If these aspects can be clearly identified and conveyed to the responsible decision maker, he may well be in a position to make an intelligent selection of a course of action, without the need for formal utility analysis, computation of Pareto optimal sets, etc. Two appropriate multivariate statistical techniques are introduced to illustrate the approach, and each technique is applied to two sample problems. Author

N80-34282# Texas A&M Univ., College Station. Inst. of Statistics.
EVALUATION OF PRECEDENCE CRITERIA FOR PROJECT SCHEDULING UNDER RESOURCE CONSTRAINTS
Shi Min Chang and Robert L. Sielken, Jr. May 1980 52 p refs
(Contract N00014-78-C-0426; NR Proj. 047-179)
(AD-A089070; THEMIS-TR-63) Avail: NTIS HC A04/MF A01 CSCL 15/5

When more than one activity in a project requires the same indivisible resource, the project schedule can resolve this resource constraint by specifying the order in which these activities are to be performed. Several heuristic criteria for determining this order are considered. The minimum cost schedule for a given project deadline can often be found by determining the optimal schedule ignoring the resource constraints and then resolving any resource usage conflicts by ordering the conflicting activities so as to minimize the project completion time. A simple procedure for determining this latter order is given. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N80-34283 Case Western Reserve Univ., Cleveland, Ohio.
VERIFICATION OF ABSTRACT TYPES WHOSE REPRESENTATIONS SHARE STORAGE Ph.D. Thesis
Raymond John Hookway 1980 192 p
Avail: Univ. Microfilms Order No. 8021697

Verification rules of abstract types which appear in the literature require that each abstract object must have an unique representation. A rule of inference allows the representation of abstract objects to share storage. The proposed rule of inference for abstract types is used for the specification and verification of a linking loader. The loader example is described in detail. It is felt that 'realistic' examples, such as the loader, are an important test of programming methodology. Verification conditions for the loader were generated by a program which uses the rule of inference for abstract types. Mechanical theorem proving assistance appears to be essential to prove verification conditions. The design of extensions to the theorem prover required to prove the verification conditions for the loader is presented.
Dissert. Abstr.

N80-34284* National Aeronautics and Space Administration, Washington, D. C.
NASA PATENT ABSTRACTS BIBLIOGRAPHY. A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 17, SECTION 2, JULY 1980
Jul. 1980 657 p
(NASA-SP-7039(17)-Section-2) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 05B

Citations of 3880 patents and patent applications for the period May 1969 through June 1980 are indexed according to subject, invention, source, number, and accession number.A.R.H.

N80-34285 Texas Univ. at Austin.
A METHODOLOGY FOR LOGICAL DESIGN OF DATABASES FOR PROJECT ENGINEERING Ph.D. Thesis
Alejandro Pablo Buchmann 1980 314 p
Avail: Univ. Microfilms Order No. 8021410

The application of database technology to process plant design is examined. The logical design of a project-wide database is developed. The need is identified for a flexible database architecutre which permits the logical database design to be independent of the database management system (DBMS). A three schema architecture is proposed and the conceptual schema is divided into a global view in terms of a conceptual model and a logical schema in the data description language of the DBMS chosen for implementation. Binary associations are used for the conceptual model. A set of criteria for the evaluation of logical database design methodologies is presented and a methodology which complies with these criteria is synthesized.

An integral part of this methodology is the use of a binary associative data dictionary that provides for computer-aided handling of database design information and assists in performing the tasks of the logical database design. The binary associative global view of a database capable of handling the process release information for the deethanizer section of an ethylene plant is designed and tested. Dissert. Abstr.

N80-34286# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
DATABASE DESIGN: CHOICE OF A METHODOLOGY
M. C. F. King, G. Naude, and S. H. vonSolms (Rand Afrikaans Univ., Johannesburg, South Africa) Dec. 1979 17 p refs
(CSIR-TWISK-102) Avail: NTIS HC A02/MF A01

Aspects are discussed of the practical application of recent relational theory. The relevant definitions, extracted from various papers, were restated using a common notation. An attempt is made to describe unambiguously two competing design procedures: synthesis and 4NF decomposition, as a basis for the discussion. It is argued that the key structure of the synthesized relations models the real world naturally; that the nonloss criterion has questionable validity in practice; that uniqueness is equally a problem in both procedures; and that multivalued dependencies are difficult to recognize. Author

N80-34287# Radian Corp., McLean, Va.
THE REVISED ORGANIC CHEMICAL PRODUCERS DATA BASE SYSTEM Interim Final Report
G. E. Wilkins, C. H. Tucker, and E. D Gibson Jun. 1980 172 p refs
(Contract EPA-68-03-2623)
(PB80-199805; RAD-TN-200-223; EPA-600/2-80-164) Avail: NTIS HC A08/MF A01 CSCL 05B

The revised Organic Chemical Producers Data Base, an automated chemical information system developed for the U.S. Environmental Protection Agency (EPA) is described. Improvements were made in two ways: (1) expansion of the data base to include more chemicals and more information about each and (2) implementation of the system through a data base management system. Chemicals are described by Chemical Abstracts Services registry number, Wiswesser Line Notation, industrial process descriptions, chemical uses, synonyms, toxicity, economic data, and producers. GRA

N80-34288# Acurex Corp., Mountain View, Calif. Energy and Environmental Div.
ENVIRONMENTAL ASSESSMENT DATA SYSTEMS: TERMINOLOGY REFERENCE MANUAL Final Report, May - Nov. 1979
R. J. Larkin and B. Ballard Feb. 1980 225 p
(Contract EPA-65-02-2699)
(PB80-197916; EPA-600/8-80-011) Avail: NTIS HC A10/MF A01 CSCL 05B

A general reference manual is presented on the terminology used to enter and retrieve information from the Environmental Assessment Data Systems (EADS), a group of interrelated computerized data bases that describe multimedia discharges. The EADS was designed to aid researchers in environmental assessment source characterization, and control technology development. The report contains the standard nomenclature or terminology used to describe certain data categories in the waste stream data bases. To selectively retrieve data from the waste stream data bases, consistent terminology must be used if the computer search is to obtain an exact match. The report contains terminology to be used to categorize sources, describe control technology, identify chemical compounds and elements, describe analytical methods in sample analysis, and list other data. The terminology applies to particle, gas, liquid, and solid discharge effluent streams. GRA

N80-34289# Environmental Protection Agency, Research Triangle Park, N.C. Monitoring and Data Analysis Div.
ENGINEERING REFERENCE MANUAL FOR CODING NEDS (NATIONAL EMISSIONS DATA SYSTEM) AND EIS/P AND R (EMISSION INVENTORY SUBSYSTEM/PERMITS AND REGISTRATION) FORMS
Apr. 1980 41 p
(PB80-194665; EPA-450/4-80-007) Avail: NTIS HC A03/MF A01 CSCL 05B

This manual provides specific engineering guidance and background information for the evaluation and reporting of source/emissions data in NEDS or EIS/P&R format. The manual is designed to assist coders of NEDS and EIS/P&R data who may not be familiar with a wide variety of industrial processes. It summarizes the purpose and organization of the manual. It also represents general coding instructions to supplement those given in other NEDS and EIS/P&R technical references, and presents general guidance regarding the use of NEDS Source Classification Codes (SCCs). GRA

N80-34290# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
MANUAL OF DOCUMENTATION PRACTICES APPLICABLE TO DEFENSE-AEROSPACE SCIENTIFIC AND TECHNICAL INFORMATION. VOLUME 2: DATA RECORDING AND STORAGE, MECHANIZATION SYSTEMS AND OPERATIONS, ANNOUNCEMENT SERVICE AND PUBLICATIONS
S. C. Schuler, ed. Jul. 1979 124 p refs 4 Vol.
(AGARD-AG-235-Vol-2; ISBN-92-835-1331-2) Avail: NTIS HC A06/MF A01

Basic mechanization and the use to computers for information processing are discussed. An introduction to the hardware and software of computer systems is given. Detailed aspects such as input of data, storage devices, output printers, system design, and bureau working are discussed. Some guidelines on the processing of chemical structure input is included. The organization and methods of production involved in various announcement publications and services including SDI are described. For individual titles, see N80-34291 through N80-34293.

N80-34291# Commission of the European Communities, Luxembourg. Directorate General for Scientific and Technical Information and Information Management.
DATA RECORDING AND STORAGE
J. Howard Petrie *In* AGARD Manual of Doc. Pract. Appl. to Defense-Aerospace Sci. and Tech. Inform., Vol 2 Jul. 1979 p 1-51 refs (For primary document see N80-34290 24-82)
Avail: NTIS HC A06/MF A01

An introduction to the hardware and software of computer systems is given, followed by a description of the problems of the input of data, including the representation of characters and the choice of a character set. The different types of input storage equipment are described and examples are given. Management and systems analysis problems are outlined in the project environment. Finally, there is a brief introduction to chemical structure input and storage techniques. Author

N80-34292# Technology Reports Centre, Orpington (England). Dept. of Industry.
MECHANIZATION SYSTEMS AND OPERATIONS
Victor J. Rogers *In* AGARD Manual of Doc. Pract. Appl. to Defense-Aerospace Sci. and Tech. Inform., Vol. 2 Jul. 1979 p 53-100 refs (For primary document see N80-34290 24-82)
Avail: NTIS HC A06/MF A01

A working basis is provided for setting up a computer system for indexing, processing, and disseminating scientific and technical information mainly in the form of bibliographic references to research report literature. Following brief references to alternative forms of mechanization, such as the tape typewriter, the main emphasis is upon the in-house computer and its uses for data capture, text handling, good quality printing, and information retrieval. Methods are described for setting up, storing, and exploiting data bases, and the procedures for creating an announcement journal are defined in detail. E.D.K.

N80-34293# Defence Research Information Centre, Orpington (England).
ANNOUNCEMENT SERVICES AND PUBLICATIONS
Elizabeth Ridler, H. *In* AGARD Manual of Doc. Pract. Appl. to Defense-Aerospace Sci. and Tech. Inform., Vol. 2 Jul. 1980 p 101-121 refs (For primary document see N80-34290 24-82)
Avail: NTIS HC A06/MF A01

The methods by which an information center announces its holdings and recent acquistions to its uers are surveyed. Examples are given of manually and computer produced bulletins from a

number of information centers and libraries, and production of indexes to computer produced bulletins is discussed. Manual and computer based SDI services are described with notes on profile construction, use of commercial magnetic tapes to extend an in-house SDI service, and standard profiles. Other services which involve repackaging the literature resources of a center are reviewed, including bibliographies, state of the art reports, and packaged information to assist industry with technical innovation. Author

N80-33374# Virginia Polytechnic Inst. and State Univ., Blacksburg.
EXPERIMENTAL TECHNIQUES FOR UNSTEADY BOUNDARY LAYERS
D. P. Telionis *In* AGARD Spec. Course on Unsteady Aerodyn. Jun. 1980 12 p refs (For primary document see N80-33363 24-02)
Avail: NTIS HC A11/MF A01

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N80-34294# Committee on Commerce, Science, and Transportation (U. S. Senate).
OPERATIONAL REMOTE SENSING LEGISLATION, PART 1
Washington GPO 1979 245 p Hearings on S. 663 and S. 875 before the subcomm. on Sci., Technol., and Transportation, 96th Congr., 1st Sess., 9 and 11 Apr. 1979
(GPO-45-048) Avail: Subcomm. on Sci., Technol., and Space

Legislation to establish an Earth data and information service in NASA is presented. Legislation to provide for the establishment, ownership, operation, and regulation of a commercial Earth resources information service, utilizing satellites and other technologies, is presented. These hearings on remote sensing were before the Subcommittee on Science, Technology, and Space of the United States Senate. T.M.

N80-34295# Committee on Commerce, Science, and Transportation (U. S. Senate).
OPERATIONAL REMOTE SENSING LEGISLATION, PART 2
Washington GPO 1979 74 p refs Hearings on S. 663 and S. 875 before the Subcomm. on Sci., Technol., and Space of the Comm. on Com., Sci., and Transportation
(GPO-52-581) Avail: Subcommittee on Science, Technology, and Space

Legislation to establish an Earth data and information service in NASA is presented. Legislation to provide for the establishment, ownership, operation, and regulation of a commercial Earth resources information service, utilizing satellites and other technologies, is presented. These hearings on remote sensing were before the Subcommittee on Science, Technology, and Space of the United States Senate. T.M.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N80-34296*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OVERVIEW OF ESCALATOR APPLICATIONS IN RAIL TRANSIT Final Report
Govind Deshpande and Louis Rubenstein 1 Jul. 1980 50 p refs
(Contract DOT-AT-80015)
(NASA-CR-163633; JPL-Pub-80-76; UMTA-CA-06-0116-80-2)
Avail: NTIS HC A03/MF A01 CSCL 13F

The difference in operating environment and in construction between escalators in transit and nontransit use, the impact of recent escalator innovations, and areas which could benefit from urban mass transportation administration sponsored research and development are determined. Several factors causing a more severe transit escalator operating environment are identified. There are no significant design differences between transit and nontransit escalators. Recent innovations that have affected performance and cost include outdoor escalators, extra flat steps at both landings, and modular escalators. Data were collected by interviews at transit agencies. Long term, unscheduled, escalator maintenance records were available for analysis from one property. A description of escalator operating principles is provided. Transit represents less than 5% of the U.S. escalator market. Transit agencies have limited leverage on escalator industry practices. A substantial impact on transit escalator cost and performance can be achieved by research identifying when and how to apply and specify several of the more recent innovations. Purchase of escalators under long term (25 year) maintenance contracts is one method that has been used to promote escalators manufactured for minimum life cycle cost. M.G.

N80-34297# Army Mobility Equipment Research and Development Center, Fort Belvoir, Va. Electric Power Lab.
VERIFICATION TEST OF THE CHANGE-OF-PACE STATION WAGON
Edward J. Dowgiallo, Jr. Jul. 1980 24 p
(Contract EC-77-A-31-1042)
(AD-A089059; MERADCOM-2304) Avail: NTIS HC A02/MF A01 CSCL 13/6

The Change-of-Pace, and electric four passenger station wagon, was tested at MERADCOM to verify conformity to the Department of Energy Performance Standards for Demonstrations, published in the Federal Register, 30 May 1978, part 5. The Change-of-Pace is manufactured in Cleveland, Ohio, by Electric Vehicles Associates. It is a converted AMC Pacer station wagon. It is powered by 20 six volt batteries that are connected to the motor through an SCR controller actuated by a foot pedal to control motor speed. The 22 horsepower motor drives the rear wheels through an automatic transmission. Regenerative braking is provided. GRA

N80-34298# Army Mobility Equipment Research and Development Center, Fort Belvoir, Va. Electrochem Div.
VERIFICATION TEST OF THE BATTRONIC MINI VAN
Edward J. Dowgiallo, Jr., Ivan R. Snellings, and William H. Blake Jul. 1980 26 p
(Contract EC-77-A-31-1042)
(AD-A089058; MERADCOM-2303) Avail: NTIS HC A03/MF A01 CSCL 13/6

The Battronic Mini Van Model No.365MLB, an electric two passenger multipurpose van, was tested at MERADCOM to verify conformity to the Department of Energy Performance Standards for Demonstrations, published in the Federal Register, 30 May 1978, part 5. The Battronic Mini Van is manufactured in Boyertown, Pennsylvania, by Battronic, Inc. It is powered by two 56-volt lead-acid batteries that are connected to the motor through an SCR control actuated by a foot pedal to control

motor speed. The 42 horsepower motor drives the rear wheels through a direct drive to the differential. Regenerative braking is provided. GRA

N80-34299# National Technical Information Service, Springfield, Va.
TECHNOLOGY ASSESSMENT. CITATIONS FROM THE NTIS DATA BASE Progress Report, Aug. 1977 - 1978
Mary E. Young Jul. 1980 267 p Supersedes NTIS/PS-79/0841 and NTIS/PS-78/0831
(PB80-813165; NTIS/PS-79/0841; NTIS/PS-78/0831) Avail: NTIS HC $30.00/MF $30.00 CSCL 05A

The bibliography cites references concerning the assessment of technology in a wide variety of fields from social to the physical sciences. The majority of the references are in the applied physical sciences, including energy. Theoretical and applied studies are covered. This updated bibliography contains 262 citations, none of which are new entries to the previous edition. GRA

N80-34300# National Technical Information Service, Springfield, Va.
TECHNOLOGY ASSESSMENT. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1979 - Jul. 1980
Mary E. Young Jul. 1980 155 p Supersedes NTIS/PS-79/0841 and NTIS/PS-78/0831
(PB80-813173; NTIS/PS-79/0841; NTIS/PS-78/0831) Avail: NTIS HC $30.00/MF $30.00 CSCL 05A

The bibliography cites references concerning the assessment of technology in a wide variety of fields from social to the physical sciences. The majority of the references are in the applied physical sciences, including energy. Theoretical and applied studies are covered. This updated bibliography contains 150 citations, 94 of which are new entries to the previous edition. GRA

88 SPACE SCIENCES (GENERAL)

N80-34301*# National Aeronautics and Space Administration, Washington, D. C.
A BIBLIOGRAPHY OF PLANETARY GEOLOGY PRINCIPAL INVESTIGATORS AND THEIR ASSOCIATES, 1979 - 1980
Ellen Lettvin, comp. and Joseph M. Boyce, comp. Sep. 1980 82 p
(NASA-TM-82180) Avail: NTIS HC A05/MF A01 CSCL 03B

This bibliography cites 698 reports and articles published from May 1979 through May 1980 by principal investigators and associates who received support from NASA's Office of Space Science, as part of the Planetary Geology program. Entries are arranged in the following categories: (1) general interest; (2) solar system, asteroids, comets, and satellites; (3) structure, tectonics, and stratigraphy; (4) regolith and volatiles; (5) volcanism; (6) impact craters; (7) Eolian studies; (8) fluvial, galcial, periglacial, and mass wasting; (9) remote sensing, radar and photometry; and (10) planetary mapping, both geological and cartographic. An author index is provided. The bibliography serves as a companion document to NASA TM 81776, 'Reports of Planetary Geology Programs, 1979-1980'. A.R.H.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N80-34302 Ohio State Univ., Columbus.
SPECTRA OF LATE-TYPE STARS IN THE ONE TO FOUR MICRON REGION Ph.D. Thesis
Curtis Philip Rinsland 1980 349 p
Avail: Univ. Microfilms Order No. 8022334

A grating spectrometer at Kitt Peak National Observatory was used to study the spectra of late-type stars in the region. Molecular band strengths and narrow-band continuum colors are reported for a sample of cool stars, mostly oxygen-rich giants and supergiants, and are compared to calculations based on model atmospheres. High-resolution laboratory spectra of the acetylene (C_2H_2) bands observed in cool carbon stars are also reported. In the reduction of the scanner data considerable attention was given to the observation of standard stars, the determination of extinction coefficients, and the establishment of a well-iterated set of 4 micron magnitudes for the standards. The photometry has probable errors of 0.015 mag in the magnitudes and 0.008 mag in the colors, an accuracy as high as is normally attained in photoelectric work. Dissert. Abstr.

N80-34303 Texas Univ. at Austin.
A STUDY OF THE 10830 A LINE OF NEUTRAL HELIUM IN THE SPECTRA OF RED GIANTS Ph.D. Thesis
George Thomas OBrien, Jr. 1980 581 p
Avail: Univ. Microfilms Order No. 8021491

The Reticon array detector on the 2.7 m telescope at McDonald Observatory was used to obtain high resolution and high signal to noise observations of the 10830 A line of neutral Helium in sixty late type (F, G, K, and M) red giants stars. Formation of this line requires temperatures of the order of 20,000 K and so it a very effective probe for the study of the high temperature chromospheres surrounding red giants. The high quality of the Reticon observations provided a much more precise determination of the dividing line in the HR diagram between those stars which have chromospheres and those which do not. A weak Helium line first appears in the mid and late F types supergiants and increases greatly in strength by spectral type G0. It appears in all K stars which have been observed, but disappears suddenly around spectRal type M1. The absence of the Helium line in most M giants suggests that these stars have at present only a warm chromosphere. Dissert. Abstr.

N80-34304 California Univ., San Diego.
AN APPLICATION OF DIGITAL IMAGE TECHNIQUES TO THE HIGH-VELOCITY MATERIAL IN NGC 1275 Ph.D. Thesis
Richard George Hier 1980 104 p
Avail: Univ. Microfilms Order No. 8023096

A charge coupled device-based detector system was developed for use in astronomical observations. This system includes minicomputer-based CCD drive and readout electronics, control and operating system, data acquisition, storage, and on-line reduction and display capabilities, and mechanical mounting and cooling systems. Tailored for use with ground-based telescopes and associated equipment. Baseline photoelectron imaging and operational characteristics of a CCD-Digicon configuration were investigated by the operation of the CCD in a demountable Digicon system, along with some computer modeling of charge packet diffusion. Results demonstrated the viability of this CCD concept, once sealed-tube fabrication problems are solved. The CCD system was coupled with a chain of phosphor output image intensiner tubes, in order to immediately apply single photon sensitive CCD techniques to astronomical problems. Dissert. Abstr.

N80-34305 Case Western Reserve Univ., Cleveland, Ohio.
A DEEP NEAR-INFRARED OBJECTIVE-PRISM SURVEY FOR CARBON STARS TOWARD THE GALACTIC CENTER AND ANTICENTER Ph.D. Thesis
Francisco Jose Fuenmayor 1980 71 p
Avail: Univ. Microfilms Order No. 8021686

A catalogue containing 283 carbon stars is presented, of which 123 have not been previously reported. A statistical analysis of the surface and space distribution of the stars in the sample was made yielding the following results: (1) The population of carbon stars observed toward the galactic anticenter is larger than the observed toward the center by a factor of 3; (2) The center-anticenter asymmetry appears to be physical and it seems to be extended to an approximate distance of 8 kiloparsecs; (3) The carbon stars in the sample appear to be concentrated at average distances of 5.0 kpc toward the galactic center, and 0.5 and 5.5 kpc toward the anticenter from the Sun. The mean space density of carbon stars at these locations is 15,20 and 50 stars per cubic kpc, respectively. The results are combined with those obtained in other investigations to discuss the distribution of carbon stars on the galactic plane. There is evidence

for an increase in the population of carbon stars from a distance of about 2 kpc from the center outwards. Dissert. Abstr.

N80-34306# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ASTRONOMICAL TELESCOPE FOR PHOTONS-GAMMA RAYS OF LOW ENERGY (APPROXIMATELY 4 MeV USING THE DIFFERENCE METHOD LIKE A VENETIAN BLIND [TELESCOPIO PARA ASTRONOMIA DE FOTOS-GAMA POUCO ENERGETICOS (APPROX. 4 MEV) POR METODO DA DIFFERENCA COM VENEZIANA]
Odylio Denys deAguiar and Inacio Malmonge Martin Jul. 1980 20 p refs In PORTUGUESE; ENGLISH summary Presented at the 32nd Reunion of Brazilian Soc. for the Progr. of Sci., Rio de Janeiro, 6-12 Jul. 1980
(INPE-1807-RPE/175) Avail: NTIS HC A02/MF A01

A description of a gamma ray telescope, which is sensitive to photons in the energy range of 3 - 10 MeV is presented. Collimation was provided by a passive shield which functioned somewhat like a 'venetian blind' to block the signal from one of the detectors. Signal subtraction techniques were used to obtain the desired information. T.M.

N80-34307*# Virginia Univ., Charlottesville.
WQ 2059-247: AN UNUSUAL HIGH REDSHIFT X-RAY CLUSTER
Richard A. White (National Radio Astronomy Observatory), Craig L. Sarazin (Dominion Astrophysical Observatory), Hernan Quintana (National Radio Astronomy Observatory), and Walter J. Jaffe [1980] 19 p refs
(Grant NAG8-308)
(NASA-CR-163619) Avail: NTIS HC A02/MF A01 CSCL 03A

X-ray, optical, and radio observations of a high redshift, Bautz-Morgan type I cluster of galaxies are reported. The cD galaxy contains a powerful, flat spectrum radio source coincident with the possibly stellar nucleus. The cluster is an extremely luminous X-ray source; however, unlike nearby luminous X-ray clusters the X-ray spectrum appears to be rather soft. Two possible interpretations of the soruces are suggested: either the intracluster gas is much cooler in high redshift clusters because they are less relaxed, or the X-ray and radio emissions from WQ 2059-247 are the result of a non thermal QSO/BL Lac type object in the nucleus of the cD. M.G.

N80-33444*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TRISCAN: A METHOD OF PRECISION ANTENNA POSITIONING
R. C. Bunce *In its* the Telecommun. and Data Acquisition Rept. 15 Oct. 1980 p 126-133 (For primary document see N80-33427 24-12)
Avail: NTIS HC A08/MF A01 CSCL 03A

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N80-34308 Colorado Univ. at Boulder.
A MATHEMATICAL APPROACH TO EMPIRICAL ASTROPHYSICS WITH APPLICATIONS Ph.D. Thesis
Derck Louis Massa 1980 264 p
Avail: Univ. Microfilms Order No. 8021605

A set of consistent and optimal mathematical techniques which are well-suited for many problems incurred in observational astrophysics is presented. These methods are first derived and then their generality is demonstrated by applying them to two fundamental and diverse astronomical problems. The first is the derivation of the form of interstellar extinction in the visible and ultraviolet. It is found that two, and only two, distinct forms exist. These forms place restrictions on the possible physical processes effecting the interstellar grains. The second is the determination of euclidian distance measures from galactic images. It is shown that the currently available data contain serious systematic errors. An approach capable of avoiding these errors is suggested. Dissert. Abstr.

N80-34309 Texas Univ. at Austin.
N-BODY SIMULATIONS OF STELLAR SYSTEMS CONTAINING MASSIVE BLACK HOLES Ph.D. Thesis
Martin James Duncan 1980 242 p
Avail: Univ. Microfilms Order No. 8021423

The stellar dynamics of spherical, collisionless systems with and without massive central black holes were investigated. A spherical collisionless N-body code was developed in order to study the cosmological infall models of galaxy formation initally proposed by Gott (1975). The simulations show that models in which primordial black holes act as a seed for galaxy formation produce projected velocity dispersion profiles which are much steeper than those observed in M87 or other ellipticals. Models without central black holes are capable of reproducing the observed density profile of M87 only at the expense of a velocity dispersion gradient that is too steep in the central regions. The small but potentially significant effects of removing the assumption of spherical symmetry are discussed in the text. Models are discussed in which an initially very small black hole grow adiabatically in an isothermal core by consuming infalling material from outside the core. A simple dynamical model for spherical, collisionless systems is also presented in which the velocity distribution is anisotropic. Dissert. Abstr.

N80-34310 Cornell Univ., Ithaca, N. Y.
TWO PROBLEMS PERTAINING TO THE DYNAMICS OF THE ORIGIN OF THE MOON, AND ITS SUBSEQUENT ORBITAL EVOLUTION Ph.D. Thesis
John Charles Nordmann 1980 137 p
Avail: Univ. Microfilms Order No. 8020910

Accretional capture of the Moon by the Earth is studied. The eccentricity of the Moon's initial heliocentric orbit, its separation from Earth at perihelion, and the time scale of accretion are varied. Within the framework of a two-body problem, a significant window for capture exists if a large portion of the Earth is accreted in less than 100 years. Accretional capture is favored by both rapid accretion rates and an eccentric heliocentric lunar orbit. The orbital evolution of a dumbbell shaped satellite with linear flexibility and damping is studied in order to model the orbital effects of tides raised on the Moon. The perturbing effects of the satellite's shape, energy storage, and dissipation will cause small deviations from the elliptical path as well as causing the orbital elements which describe the ellipse to slowly change in time. Dissert. Abstr.

N80-34311 Texas Univ. at Austin.
TWO ASTROPHYSICAL PROBLEMS IN LATE-TYPE PECULIAR STARS: CALCIUM IN SUPER-METAL-RICH STARS; AND CARBON NITROGEN AND OXYGEN IN WEAK G-BAND STARS Ph.D. Thesis
Roger William Day 1980 205 p
Avail: Univ. Microfilms Order No. 8021420

The metallicity and atmospheric structure of the super-metal-rich (SMR) stars is investigated. High disperson coude echelle scans of the (Ca II) lambda 7323.9 A forbidden line and the Ca I lambda 6572.8 A intercombination line were obtained for three SMR K giants and for three K giant standards. Abundances obtained from the (Ca II) line indicate that calcium is overabundant by +0.2-0.4 dex in these SMR stars, relative to the Sun. This supports the view that the metal enhancements reported by many observers are real. Boundary temperatures derived from the Ca I line indicate that some degree of boundary cooling (approx. < 200-300 K) exists in the SMR stars, relative to normal abundance stars. In addition, the carbon, nitrogen and oxygen (CNO) abundances in the weak G-band stars are investigated. High dispersion photographic coude spectra were obtained for the weak G-band stars HR 6791 and HR885, and for the solar abundance standard, epsilon Vir. The results show that the atmospheres of these stars have undergone a greater exposure to CN-cycle processing than is predicted by current stellar evolution theory. A review of the observed properties of the weak G-band stars and of postulated mixing mechanism leads to a proposed evolutionary interpretation of these objects. Dissert. Abstr.

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N80-34312 South Carolina Univ., Columbia.
GEOLOGIC IMPLICATIONS OF REGIONAL SCALE VARIATION IN LUNAR CRATER SHAPE. FOURIER CRATER SHAPE ANALYSIS Ph.D. Thesis
Duane Thomas Eppler 1980 118 p
Avail: Univ. Microfilms Order No. 8022378

R-mode factor analysis of Fourier harmonics that described the shape in plan of 960 large (> 15 km diameter) craters from across the lunar nearside shows that crater shape carries information regarding the structural and stratigraphic state of lunar crust. Observed deviations in the crater outline from circularity as described by factor 2 (harmonic 2,3, 4, and 6) arise principally from variation in the geologic structure and stratigraphy of lunar crust and regolith. Modification of the crater outline by ejecta scour, flooding of the crater floor by upwelling magma, and degradation of the crater rim by ongoing meteorite bombardment affects shape components described by factor 2 to only a limited extent. Shape effects due to topography, oblique impact, and primary or secondary origin are not manifest in factor 2 harmonics. Clusters of polygonal craters define a series of broad-scale acurate patterns in an adjacent to the southern highlands of the lunar nearside. The age of craters that define these patterns suggests that the age of features they represent is pre-Imbrian. Dissert. Abstr.

N80-34313 California Inst. of Tech., Pasadena.
COMPARATIVE PETROLOGY OF THE APOLLO 11 MARE BASALT, PART 1. THE OXYGEN ISOTOPE GEOCHEMISTRY OF THE ABITIBI GREENSTONE BELT, PART 2 Ph.D. Thesis
David Wayne Beaty 1980 475 p
Avail: Univ. Microfilms Order No. 8019979

The 73 Apollo 11 basalt samples can be divided into five petrologic groups which must represent at least five separate igneous cooling units (ranging from 3.90 b.y. to 360 by.). Photogeologic studies of the landing site indicate that three mare units crop out, and that the lunar module set down on the oldest of the three. The exposure data suggest that the high-K flow(s)is the surficial rock type at the landing area, and is therefore the oldest of the three surficial units. The interaction between Archean oceanic crust and Archean seawater was also investigated by studying the well-preserved Abitibi greenstone belt using oxygen isotopes and the petrographic microscope. All of the volcanic rocks have been subjected to a hydrothermal process of some sort (abundant chlorie, epidote and actinolite). The metamorphic grade decrease in a general way with structural height, while delta O-18 shows a complementary increase (typically +6to 10 from base to top). The detailed relationships between delta O-18 (WR and minerals), SiO2-content, and degree recrystallization of individual samples indicate that the gradient in is an alteration (rather than primary) feature. Dissert Abstr.

N80-34314 California Univ., Los Angeles.
CARBONATE FORMATION ON MARS Ph.D. Thesis
Michael Cameron Booth 1980 157 p
Avail: Univ. Microfilms Order No. 8023278

Rates of carbonate growth in simulated Martian environments were found to be 1.0 x 10 to the 11th power to 1.5 x 10 to the 12th power molecules sq m/sec in olivine tholeiite. Carbonate growth was examined as a function of partial pressures of CO2 and H2O, pO2 total water content, ultraviolet illumination, soil composition and temperature maxima, illumination/temperature cycling frequency, and time. Carbonate formation in nonaqueous environments is concluded to be the product of the heterogeneous reaction of atmospheric CO2 with water derived OH(-) at silicate surfaces and should occur on Mars, barring impeding reactions in the martian environment. Estimated rates of CO2 fixation by nonaqueous carbonate formation are sufficient to store the entire estimated planetary inventory of CO2 of 4 x 10 to the 20th power grams outgassed during martian geologic history without invoking periods of more rapid rates of storage due to liquid water. Carbonate derived by nonaqueous means should form submicrometer alteration rinds on reactive minerals exposed to the martian surface environment without cation preference for calcium, magnesium, or iron. Dissert. Abstr.

N80-34315 Maryland Univ., College Park.
CORRECTION, CORRELATION, AND THEORETICAL CONSIDERATION OF LUNAR X-RAY FLUORESCENCE INTENSITY RATIOS Ph.D. Thesis
Pamela Elizabeth Clark 1979 184 p
Avail: Univ. Microfilms Order No. 8021867

Lunar orbital X-ray fluorescence (XRF) data obtained during the Apollo 15 and 16 missions are corrected, correlated with related lunar data sets, and compared to theoretically calculated X-ray fluorescence and scatter data. XRF Mg/Si and Al/Si ratios are corrected for variations in solar activity, a principal source of spurious interorbital variation, by the use of a solar model and independent solar flux measurements from the Solrad 10 satellite. Orbital variations in the background, which, it was thought, might have been a source on interorbital variation in the Mg/Si data, are investigated, and no such systematic variations in the background are found. A semi-quantitative color correlation technique is developed to compare related remote sensing data. Theoretical calculations of the expected X-ray flux for Si, Al, and Mg at typical lunar soil concentrations compared favorably with orbital measurements for these soils. Scattering data calculated for Si, Al, and Mg for typical lunar soils, are found to be largely independent of concentration. The minimum concentration at which Mg and Al can be detected from orbital data is determined. Dissert. Abstr.

N80-34316 Iowa Univ., Iowa City.
THE JOVIAN MAGNETOSPHERE Ph.D. Thesis
Jeffrey Lee Parish 1980 186 p
Avail: Univ. Microfilms Order No. 8022059

Two models are given for the Jovian magnetosphere. These models use the Pioneer 10 outbound magnetic field model and single fluid MHD equations to find the parameters of interest. In the first model exact corotation of the thermal plasma is assumed. In the second model corotation is broken. With exact corotation the pressure, which falls approximately as R(-4), the density, which falls approximately as R(-6) and the temperature, which increases approximately as R(2) is found. The half-width of the current sheet is found to be approximately 3 R sub J. The diffusion is very much like the Bohm diffusion coefficient. The magnitude of the diffusion coefficient is very large which indicates anomalous diffusion. In the second model, density and temperature gradients cause the thermal plasma to flow upward. These flow velocities are in a magnetic field which turns the outward velocity into the azimuthal direction. Breaking corotation does not change the pressure calculated in the first mode. The temperature is proportional to the angular velocity squared. Because of this the number density falls as R(-2) which is much slower than the previous model and the temperature now decreases as R(-2) instead of increasing with R. his model also gives the radial mass flux. Dissert. Abstr.

N80-34317 Colorado Univ. at Boulder.
SPECTROSCOPY OF THE MARS AIRGLOW FROM MARINER 9 ULTRAVIOLET SPECTROMETER DATA Ph.D. Thesis
Robert Raymond Conway 1980 222 p
Avail: Univ. Microfilms Order No. 8021560

Mars airglow spectra obtained by the ultraviolet spectrometer on board the Mariner 9 spacecraft were analyzed by using a high resolution synthesis of the observed emissions. These bright limb observations were made of altitudes between 180 and 88 km. The carbon monoxide Cameron bands are the most intense spectral features of the Mars airglow and analysis shows that the shape of these bands is best characterized by a rotational temperature of 1750 K. The observed zenith intensity of the Cameron bands is 151 KR. The first negative bands of the carbon ion and the Vegard-Kaplan bands of molecular nitrogen are not detectable in Mariner 9 spectra, a result consistent with the excitation theory of these bands. The gamma bands of nitric

oxide with intensities calculated from the number densities observed by Viking are found to be blended with the bright (0,1) Cameron band. Uncertainties in the shape of the individual Cameron bands exclude a positive identification of the gamma bands. Dissert. Abstr.

N80-34318*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VOYAGER ENCOUNTERS JUPITER
Jul. 1979 41 p Sponsored by NASA Original contains color illustrations
(NASA-CR-163607; JPL-400-24) Avail: NTIS HC A03/MF A01 CSCL 03B

Images of Jupiter and its satellites are presented. The photographs were taken by the Voyager 1 Spacecraft and the Voyager 2 Spacecraft. A brief description of the Voyager project is given. T.M.

N80-34319*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
EFFECTIVE DEPTH OF SPECTRAL LINE FORMATION IN PLANETARY ATMOSPHERES
J. P. Lestrade and J. W. Chamberlain [1980] 13 p refs
(Grant NsG-7043)
(NASA-CR-163617) Avail: NTIS HC A02/MF A01 CSCL 03B

The effective level of line formation for spectroscopic absorption lines has long been regarded as a useful parameter for determining average atmospheric values of the quantities involved in line formation. The identity of this parameter was recently disputed. The dependence of this parameter on the average depth where photons are absorbed in a semi-infinite atmosphere is established. It is shown that the mean depths derived by others are similar in nature and behavior. A.R.H.

N80-34320*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SATURN: ORIGIN AND COMPOSITION OF ITS INNER MOONS AND RINGS
A. J. R. Prentice 15 Oct. 1980 20 p refs
(Contract NAS7-100)
(NASA-CR-163630; JPL-Pub-80-80) Avail: NTIS HC A02/MF A01 CSCL 03B

The contraction of the primitive protosaturnian cloud, using ideas of supersonic turbulent convection was modeled. The model suggested that each of Saturn's inner moons, excepting Rhea, condensed above the ice-point of water and consists primarily of hydrous magnesium silicates. The satellite mean densities steadily increase towards the planet and the rocky moons are irregular in shape. T.M.

N80-34321*# Arizona Univ., Tucson. Lunar and Planetary Lab.
HEAVY IONS IN JUPITER'S ENVIRONMENT
R. A. Brown [1980] 8 p refs
(Grant NsG-7634)
(NASA-CR-163603) Avail: NTIS HC A02/MF A01 CSCL 03B

The extended atmosphere of the Jupiter system consists of atoms and ions of heavy elements. This material originates on the satellite Io. Energy is lost from the thermal plasma in collisionally excited optical and ultraviolet emission. The juxtaposition of Earth and spacecraft measurements provide insight concerning the underlying processes of particle transport and energy supply. R.K.G.

N80-34322*# Delaware Univ., Newark.
MASS LOSS FROM WARM GIANTS: MAGNETIC EFFECTS
D. J. Mullan [1980] 5 p refs
(Contract NAS5-25762; Grant NAGw-5)
(NASA-CR-163602; BA-80-31) Avail: NTIS HC A02/MF A01 CSCL 03B

Among warm giant stars, rapid mass loss sets in along a well defined velocity dividing line (VDL). Hot corona also disappear close to the VDL and thermal pressure cannot drive the observed rapid mass loss in these stars. The VDL may be associated with magnetic fields changing from closed to open. Such a change is consistent with the lack of X-rays from late-type giants. A magnetic transition locus based on Pneuman's work on helmet streamer stability agrees well with the empirical VDL. The change from closed to open fields not only makes rapid mass loss possible, but also contributes to energizing the mass loss in the form of discrete bubbles. R.K.G.

N80-34323# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). National Council for Scientific and Technical Research.
ON THE COMET MODEL OF BIERMANN ET AL [SOBRE O MODELO COMETARIO DE BIERMANN ET AL]
Rene Adalid Medrano-B and Paulo Roberto G. Torquato (Inst. Technol. de Aeronautica, Sao Jose dos Campos, Brazil) Jun. 1980 19 p refs In PORTUGUESE; ENGLISH summary
(INPE-1805-RPE/173) Avail: NTIS HC A02/MF A01

The Biermann equations for the interaction between solar wind and comets are solved for gamma = 2 and gamma = 5/3. The interplanetary magnetic field in the ionized atmosphere of comets is described. Transl. by S.F.

N80-34324* National Aeronautics and Space Administration, Washington, D. C.
VOYAGER 1: ENCOUNTER WITH SATURN
Nicholas Panagakos 23 Oct. 1980 48 p
(NASA-News-Release-80-159; PB0-10167) Avail: NASA Scientific and Technical Information Facility, P. O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 03B

The history of the Voyager Project is reviewed as well as known facts about Saturn and its satellites. Important results of encounters with Jupiter are summarized. Scientific objectives of the flyby of Saturn involve the planet's atmosphere, rings, and magnetic field interactions with the solar wind and satellites. The search for additional satellites, and various aspects of Titan, Rhea, Dione, Mimas, Iapetus, Hyperion, and Enceladas are also of interest. The instruments developed to obtain these goals are described. A.R.H.

N80-33822# Washington Univ., Seattle. Dept. of Atmospheric Sciences and Geophysics Group.
OROGRAPHIC EFFECTS IN THE ATMOSPHERES OF OTHER PLANETS
Conway B. Leovy *In* WMO Orographic Effects in Planetary Flows Jun. 1980 p 357-370 refs (For primary document see N80-33811 24-42)
Avail: NTIS HC A12/MF A01

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N80-34325 Colorado Univ. at Boulder.
MESOGRANULATION AND SUPERGRANULATION IN THE SUN Ph.D. Thesis
Laurence Jay November 1980 256 p
Avail: Univ. Microfilms Order No. 8021614

Simultaneous satellite and ground based observations of supergranular velocities in the Sun were made. Observations are compared with the steady Doppler velocities seen toward the limb and at disk center in several spectral lines that span 1400 km in their heights of formation. Supergranular flows are able to penetrate at least 11 density scale heights in the atmosphere. A change occurs in the flow structure: whereas the horizontal component of the velocity predominates in the low photosphere, suggesting strong braking of the vertical momentum there, the motions higher in the atmosphere are more isotropic. Observations at disk center show a 7000 km scale of motion, which may be convective in origin. If the scale of granulation is related to the depth of the HI ionization zone, and that of supergranulation to the HeII zone, then the mesogranules may represent the scale of motion driven in the HeI ionization zone. Dissert. Abstr.

N80-34326*# California Inst. of Tech., Pasadena. Div. of Geology and Planetary Sciences.

THEORETICAL STUDIES OF SOLAR OSCILLATIONS Final Report, 1 Oct. 1976 - 30 Sep. 1980
Peter Goldreich 23 Oct. 1980 64 p refs
(Grant NsG-7342)
(NASA-CR-163611) Avail: NTIS HC A04/MF A01 CSCL 03B

Possible sources for the excitation of the solar 5 minute oscillations were investigated and a linear non-adiabatic stability code was applied to a preliminary study of the solar g-modes with periods near 160 minutes. Although no definitive conclusions concerning the excitation of these modes were reached, the excitation of the 5 minute oscillations by turbulent stresses in the convection zone remains a viable possibility. Theoretical calculations do not offer much support for the identification of the 160 minute global solar oscillation (reported by several independent observers) as a solar g-mode. A significant advance was made in attempting to reconcile mixing-length theory with the results of the calculations of linearly unstable normal modes. Calculations show that in a convective envelope prepared according to mixing length theory, the only linearly unstable modes are those which correspond to the turbulent eddies which are the basic element of the heuristic mixing length theory. A.R.H.

N80-34327*# Atsuko Computing International, Huntsville, Ala.
SUN SERIES PROGRAM FOR THE REEDA SYSTEM Final Report
Robert W. Shankle 3 Jul. 1980 80 p
(Contract NAS8-33814)
(NASA-CR-161579; ACI-070380-F) Avail: NTIS HC A05/MF A01 CSCL 03B

Modifications made to data bases and to four programs in a series of computer programs (Sun Series) which run on the REEDA HP minicomputer system to aid NASA's solar activity predictions used in orbital life time predictions are described. These programs utilize various mathematical smoothing technique and perform statistical and graphical analysis of various solar activity data bases residing on the REEDA System. A.R.H.

N80-34328*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE MINIMUM FLUX CORONA; THEORY OR CONCEPT
J. H. Underwood and S. K. Antiochos Sep. 1980 10 p refs
Prepared in cooperation with Stanford Univ.
(Contract NAS7-100; Grant NGL-05-020-272)
(NASA-CR-163636; SU-IPR-814) Avail: NTIS HC A02/MF A01 CSCL 03B

The reply to the criticisms of the minimum flux theory is discussed. These criticisms are correct in substance, as well as in detail. Counter arguments that the minimum flux corona theory is untenable, because of errors in its formulation, are presented. T.M.

N80-34329# Stanford Univ., Calif. Inst. for Plasma Research.
EXTREME ULTRA-VIOLET EMISSION FROM CORONAL STRUCTURES
W. H. Tucker Jul. 1980 11 p refs
(Contract N00014-75-C-0673)
(AD-A087803; SU-IPR-813) Avail: NTIS HC A02/MF A01 CSCL 03/2

We calculate the XUV line and broad-band emission from a model active-region loop. The spectrum is found to be sensitive to both the coronal heating rate and to the loop geometry. GRA

N80-34330# Stanford Univ., Calif. Inst. for Plasma Research.
CORONAL HEATING BY STOCHASTIC MAGNETIC PUMPING
P. A. Sturrock and Y. Uchida (Tokyo Astronomical Observatory, Japan) Jun. 1980 19 p
(Grant NGL-05-020-272; Contract N00014-75-C-0673)
(NASA-CR-163637; AD-A087804; SU-IPR-809) Avail: NTIS HC A02/MF A01 CSCL 03B

Recent observational data cast serious doubt on the widely held view that the sun:s corona is heated by traveling waves (acoustic or magnetohydrodynamic). It is here proposed that the energy responsible for heating the corona is derived from the free energy of the coronal magnetic field derived from motion of the :feet: of magnetic field lines in the photosphere. Stochastic motion of the feet of magnetic field lines leads, on the average, to a linear increase of magnetic free energy with time. This rate of energy input is calculated for a simple model of a single thin flux tube. The model appears to agree well with observational data if the magnetic flux originates in small regions of high magnetic field strength as proposed by Tarbell, Title and Schoolman. On combining this energy input with estimates of energy loss by radiation and of energy redistribution by thermal conduction, we obtain scaling laws for density and temperature in terms of length and coronal magnetic field strength. GRA

N80-34331# Boston Univ., Mass. Dept. of Astronomy.
CORRELATION OF HIGH LATITUDE CORONAL HOLES WITH SOLAR WIND STREAMS HIGH ABOVE OR BELOW THE ECLIPTIC
Kile B. Baker and Michael D. Papagiannis Apr. 1980 58 p refs
(Contract F19628-77-C-0189; AF Proj. 2311)
(AD-A087525; ACBU-SER-II-71; SCIENTIFIC-3; AFGL-TR-80-0123) Avail: NTIS HC A04/MF A01 CSCL 03/2

This report has correlated the positions of high latitude coronal holes as determined from the Helium 10830 A spectroheliograms, with the velocities of solar wind streams high above or below the ecliptic, which could have originated from the same positions as the coronal holes. The solar wind speeds were determined from interplanetary scintillation (IPS) measurements made at the University of California at San Diego and at the Toyokawa Observatory in Japan. The correlation covered the two and a half year period, January 1, 1977 to June 30, 1979, during which there were no large equatorial coronal holes present, since we were approaching solar maximum. We have found that these high latitude coronal holes are often, but not always, correlated to high speed solar wind streams. The lack of a clearer correlation can be attributed to uncertainties in the solar wind velocities obtained from IPS measurements, to uncertainties in the exact boundaries of the coronal holes, and to the deflection or attenuation of relatively weak solar wind streams in interplanetary space. GRA

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N80-34332 California Univ., San Diego.
COSMIC-RAY PRODUCED RADIONUCLIDES IN EXTRATERRESTRIAL MATERIAL Ph.D Thesis
Michael Tildon Murrell 1980 166 p
Avail: Univ. Microfilms Order No. 8023109

The history of solar cosmic rays, the rates and extents of various processes on the lunar surface, and the history of the meteoroid flux in all size ranges are discussed. Topics covered include: (1) Mn-53 and Al-26 activities in samples ground from the upper 1.5 cm of lunar rock 68815; (2) Mn-53 activity in soil and individual rocklets from lunar core sample 60010, soil samples from double drive tubes 12025/28 and 74001/2 and the Appollo 15 and 16 drill stems, and magnetic and nonmagnetic separates from the upper 35g/sq cm of the Apollo 17 drill stem; (3) Mn-32 in nine Allan Hills -77 Antarctic meteorites; (4) I-129 in the Bruderheim and Dhajala meteorites; and (5) stony spherules and iron spherules from Pacific clay. Dissert. Abstr.

N80-34333 Ohio State Univ., Columbus.
RADIO SPECTRAL CHARACTERISTICS OF EXTRAGALACTIC OBJECTS Ph.D. Thesis
Erich Pacht 1980 296 p
Avail: Univ. Microfilms Order No. 8022321

The radio two and four color spectral distributions associated with the various types of extragalactic objects identified with radio sources were studied as well as the dependence of the distributions on several variables such as flux density, redshift, radio luminosity, survey frequency, radio variability, and optical

and radio morphology. Several correlations between radio spectra and sources properties were found. Among the most significant is the correlation between quasars with peaked spectra and high redshift values, the high-frequency spectral index-luminosity correlation for nonpower-law spectra galaxies, and the dependence of the radio two-color spectral distributions on the optical morphology of the radio sources. Evidence that the continuum radio spectrum of the quasars is being Doppler-shifted is obtained from a high-z ($z > 1.75$) sample of 89 objects and a low-z ($z < 0.60$) sample of 102 objects. The mean spectral indices of the two samples are identical within error limits over the spectral region which originates in the same rest frequency window.
Dissert. Abstr.

N80-34334 Maryland Univ., College Park.
COSMIC RAY PROPAGATION AND INSTABILITIES Ph.D. Thesis
Philip Joseph Morrison 1979 157 p
Avail: Univ. Microfilms Order No. 8021877

The standard analysis of cosmic ray propagation is extended to consider the conditions under which the waves resulting from the combination of cosmic rays in a background plasma are not Alfven. The wave dispersion equation is first recalculated for wavelengths much longer than generally considered in the standard theory. Next the dispersion equation is found for physical conditions which produce a large growth rate. Two results are found. One is a kink-mode instability which occurs if there is a net current in the wave frame which produces a helical perturbation in the background reference frame. The second result is that for conditions which would result in a growth rate much larger than the wave frequency, as calculated by the results of the standard model (which strictly holds only the limit gamma approaches 0), the wave phase velocity (and frequency) is increased markedly while the growth rate is limited in magnitude to the wave frequency. These results are calculated and compared to the results of the standard model for a wide variety of astrophysical situations. Dissert. Abstr.

N80-34335 California Inst. of Tech., Pasadena.
RELATIVISTIC EFFECTS IN EXTRAGALACTIC RADIO SOURCES Ph.D. Thesis
Arieh Konigl 1980 181 p
Avail: Univ. Microfilms Order No. 8021279

Compact extragalactic radio sources are interpreted in the context of the twin-beam model, with a particular emphasis on the role of special relativistic kinematical and dynamical effects. Various such effects are investigated, both in a general manner and in application to specific observed phenomena. Among the observed phenomena considered are apparent superluminal flux variations which occur on timescales short compared with the light travel time across the apparent source and the apparent superluminal separation of source components. The steady two dimensional flow of an ideal compressible fluid is studied in the context of special relativistic gas dynamics. The Newtonian equations for potential flow are generalized, and it is found that they can have the same form in the Newtonian and the relativistic regimes if their parameters are defined in the local rest frame of the fluid. The Mach number thus defined is shown to have the same properties as its Newtonian analog. The Newtonian equations for oblique plane shock waves are similarly generalized in certain cases (which include, in particular, the extreme relativistic limit). Dissert. Abstr.

N80-34336 Utah Univ., Salt Lake City.
A PRECISE MEASUREMENT OF THE SIDEREAL ANISOTROPY OF COSMIC RAYS NEAR 1500 GV Ph.D. Thesis
Dan Jerome Cutler 1980 191 p
Avail: Univ. Microfilms Order No. 8022208

The Utah underground muon detector monitors muon flux produced by primary cosmic rays having a median rigidity of 1500 GV. The detector, located 507 hg sq cm underground consists of 300 plastic scintillation counters arranged in three layers separated by 75 g/ sq cm of concrete absorber. With 37.3 sq m of sensitive area per layer, the 3-layer coincidence rate is 47/sec. Right ascension resolution is about 15 deg. In principle, no declination information is available from such experiments. When an event occurs, an on-line computer reads all of the latches, tallies recognizable single muon events in any one of 1900 channels, and records summaries every half hour. Discrete Fourier transform (DFT) techniques are applied to the problems of picking out stationary sinusoidal signals buried in noise and of understanding the temperature induced fluctuations in the muon flux. A sidereal anisotropy in the relative intensity is found. The first and second harmonic amplitudes are discussed. Dissert. Abstr.

N80-34337# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MEASUREMENTS OF SECONDARY COSMIC RADIATION ABOARD A JET AIRCRAFT AT ALTITUDES OF 12 AND 12.5 km OVER BOA VISTA AND CAMPINAS [MEDIDAS DA RADIACAO COSMICA SECUNDARIA A BORDO DE AVIAO A JATO EM ALTITUDES DE 12 E 12.5 KM ENTRE BOA VISTA E CAMPINAS]
Inacio MalMonge Martin, Daniel Jean Roger Nordemann, Fernando Gonzalez Blanco, Renato Senador, and Jose Angelo daCostaFerreiraNeri Jun. 1980 21 p refs In PORTUGUESE; ENGLISH summary Sponsored by FINEP and NSF
(INPE-1808-RPE/176) Avail: NTIS HC A02/MF A01

Secondary cosmic rays between .3 MeV and 5 MeV were measured using a NaI gamma-ray spectrometer, an analog to digital converter, and a magnetic tape recorder carried on board a Sabreliner, during flights between Campinas-Brasilia-Manaus-Boa Vista at altitudes of 39,000 and 41,000 feet. Calibration measurements were made also at the ground level, near Brasilia, Manaus and Sao Jose dos Campos. Variations of the counting rate of the secondary cosmic-ray for several energy bandwidths versus latitude in the lower atmosphere were obtained for the first time in Brazil. A.R.H.

99 GENERAL

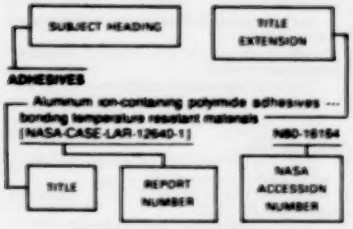
N80-34338# Cambridge Electron Accelerator, Mass. Research Lab. of Electronics.
RESEARCH IN GENERAL PHYSICS, PLASMA DYNAMICS, AND COMMUNICATION SCIENCES AND ENGINEERING Progress Report, 1 Jan. 1979 - 31 Dec. 1979
P. A. Wolff and J. Allen Jan. 1980 265 p
(RLE-PR-122) Avail: NTIS HC A12/MF A01

Research in general physics and plasma dynamics is reported. Research in the communication sciences and engineering is also reported. A list of publications and reports is presented. T.M.

N80-34339# Aeronautical Research Labs., Melbourne (Australia).
REPORT ON VISIT TO EUROPE IN MAY 1979, COVERING THE 16TH MEETINGS OF THE INTERNATIONAL COMMITTEE ON AERONAUTICAL FATIGUE AND ASSOCIATED VISITS
G. S. Jost Jul. 1979 26 p refs Meeting held in Brussels, May 1979
(AD-A074392; ARL/Struc-TM-293) Avail: NTIS HC A03/MF A01 CSCL 01/3

In May 1979 the author attended the 16th Meetings of the International Committee on Aeronautical Fatigue held in Brussels, Belgium. Following these Meetings, technical visits were made to establishments in Britain, France and Germany. GRA

Typical Subject Index Listing



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7050).

A

A-6 AIRCRAFT
Technical Review, volume 15, no. 1 [ISSUE-1] N80-33337
Circulation Control Wing (CCW) Flight Tests N80-33339

ABERRATION
Wavefront deconvolution studies [AD-A088548] N80-34278

ABLATION
Doppler velocimeter for laser accelerated targets [AD-A089134] N80-33739

ABRASIVES
Magnetic-abrasive machining [BLL-RTS-12400] N80-33742

ABSORBENTS
Characterization of surface complexes on lithium N80-33546

ABSORBERS (MATERIALS)
The solution cycle in an absorption system with pressure equalising gas (theoretical and experimental investigations) [BLL-RTS-12307] N80-33608

ABSORPTION SPECTRA
Studies in atomic absorption spectroscopy utilizing electrothermal atomization N80-33513
Effective depth of spectral line formation in planetary atmospheres [NASA-CR-163617] N80-34319

ABSTRACTS
Verification of abstract types whose representations share storage N80-34283

ACCELERATED LIFE TESTS
Technology of elevated voltage solar arrays — 250 kW N80-33903

ACCELERATION (PHYSICS)
Effect of periodic exposure to head-pelvis accelerations on a short-arm centrifuge on responses of the human cardiovascular system N80-34071
Collective acceleration of ions in vacuum N80-34230

ACCELERATION STRESSES (PHYSIOLOGY)
Technical Review, volume 15, no. 1 [ISSUE-1] N80-33337
Loss of consciousness in high performance fighters (what to do about it) N80-33341

ACCESS TIME
Performance of computers with multiaccess memory N80-34107

ACCURACY
In situ ozone data for evaluation of the laser absorption spectrometer ozone remote sensor: 1979 southeastern Virginia urban plume study summer field program [NASA-TM-81831] N80-33928

ACETATES
Vinyl acetate emulsion polymerization kinetics and mechanism N80-33567

ACETONE
Effects of different hygienic factors on exhalation of acetone by man N80-34078

ACIDITY
The determination of uni and tri valent gold in acid gold baths [BLL-RTS-12157] N80-33504

ACOUSTIC DUCTS
A feasibility study of a 3-D finite element solution scheme for aeroengine duct acoustics [NASA-CR-159359] N80-34216

ACOUSTIC MEASUREMENTS
Ultrasound level-meter for measuring propellant levels in Ariane tanks in its first and second stages N80-33615

ACOUSTIC PROPAGATION
Assessment of seabed seismic systems [PB80-195985] N80-34010
Acoustic plane waves incident on an oblique clamped panel in a rectangular duct [KU-FRL-417-14] N80-34215

ACOUSTICS
An evaluation of a computer code based on linear acoustic theory for predicting helicopter main rotor noise — CH-53A and S-76 helicopters [NASA-CR-159339] N80-34217

ACOUSTO-OPTICS
Evaluation of specialized photoacoustic absorption chambers for Near Millimeter Wave (NMMW) propagation measurements [AD-A088842] N80-33654
Single chip lenses for ultrasonic imaging [AD-A088857] N80-34220

ACRYLONITRILES
Sorption, transport and diatometric studies in glassy polymers N80-33569

ACTIVATED CARBON
The activated carbon thin film adsorber N80-33518
Testing iodized activated carbon filters with nonradioactive methyl iodide [AD-A088686] N80-33522

ADAPTIVE CONTROL
Application of a hierarchical structure stochastic learning automation [S/IS-7906] N80-34151

ADDITION THEOREM
Generalized addition sets N80-34171

ADHESIVE BONDING
Improved bond coatings for use with thermal barrier coatings [NASA-TM-81567] N80-33556
A design study in crack patching [ARL/STRUC-REPT-376] N80-33799
Manufacturing of space telescope solar array blankets N80-33675
Ultrathin cell module technology — silicon N80-33676

ADHESIVES
LARC-13 adhesive development [NASA-CR-159317] N80-33497
Polyimides: Thermally stable aerospace polymers [NASA-TM-81884] N80-33571

ADIABATIC CONDITIONS
The effect of surface energy on temperature rise around a fast running crack [AD-A088756] N80-33804

ADSORBENTS
The activated carbon thin film adsorber N80-33518
Evaluation of solid adsorbents for collecting atmospheric chlorinated hydrocarbons [PB80-196526] N80-33978

AERIAL EXPLOSIONS
Explosion hazards of transport gases: Research within the reactor safety program of the Federal Republic of Germany N80-33586
TNT equivalency testing of chemical mixtures in continuous TNT manufacturing [AD-A088903] N80-33600

AERIAL PHOTOGRAPHY
Monitoring by aerial and terrestrial photogrammetry [PB80-192925] N80-33976

AERIAL RECONNAISSANCE
Development of a technique for determining natural radioactivity using slow-speed aircraft at low altitudes [INPE-1831-RPE/195] N80-33938
Measurements of secondary cosmic radiation aboard a jet aircraft at altitudes of 12 and 12.5 km over Boa Vista and Campinas [INPE-1808-RPE/176] N80-34337

AEROACOUSTICS
Evaluation of Aero Commander sidewall vibration and interior acoustic data: Static operations [NASA-CR-159290] N80-33392
A feasibility study of a 3-D finite element solution scheme for aeroengine duct acoustics [NASA-CR-159359] N80-34216
Aircraft noise prediction program validation [NASA-CR-159333] N80-34219

AERODYNAMIC BALANCE
Rotary balance data for a typical single-engine general aviation design for an angle of attack range of 8 deg to 90 deg. 1: Low wing model C — wind tunnel tests [NASA-CR-3200] N80-33355

AERODYNAMIC CHARACTERISTICS
Low-speed aerodynamic characteristics of a highly swept arrow wing configuration with several deflected leading edge concepts [NASA-TM-80180] N80-33347

AERODYNAMIC COEFFICIENTS
A digital unit for measuring unsteady pressure coefficients — in a wind tunnel N80-33619

AERODYNAMIC CONFIGURATIONS
Conceptual study of an advanced supersonic technology transport (AST-107) for transpacific range using low-bypass-ratio turbofan engines [NASA-TM-81872] N80-33342
VASCOMP 2. The V/STOL aircraft sizing and performance computer program. Volume 6: User's manual, revision 3 [NASA-CR-163639] N80-33401

High bypass turbofan component development. Amendment 1: Small fan redesign [AD-A089067] N80-33413
AERODYNAMIC DRAG
Afterbody drag. Volume 3: Literature survey — bibliographies [AD-A089938] N80-33361
AERODYNAMIC FORCES
A simple method for converting frequency domain aerodynamics to the time domain [NASA-TM-81844] N80-33358
Special Course on Unsteady Aerodynamics [AGARD-R-679] N80-33360
Unsteady aerodynamics in turbomachinery N80-33369
Role of unsteady aerodynamics in aircraft response N80-33371
Nonstationary random response of structural systems to aerodynamic wind forces N80-33775
AERODYNAMIC LOADS
A flight investigation of performance and loads for a helicopter with 10-64C main rotor blade sections [NASA-TM-81871] N80-33348
Application of identical aerodynamic functions N80-33372
Loads calibrations of strain gage bridges on the DAST project Aeroelastic Research Wing (ARW-1) [NASA-TM-81889] N80-33393
Fatigue testing of vampire wings [ARL/STRUC-REPT-378] N80-33399
AERODYNAMIC NOISE
Implications of requiring new production of older aircraft types (less than 75,000 pounds) to meet amended noise standards [AD-A088577] N80-33967
Aircraft noise prediction program validation [NASA-CR-159033] N80-34219
AERODYNAMIC STALLING
Technical Review, volume 15, no. 1 [ISSUE-1] N80-33337
NASA general aviation stall/spin flight testing N80-33340
AERODYNAMICS
Aeronautical engineering: A continuing bibliography, supplement 125 [NASA-SP-7037(125)] N80-33336
Experimental unsteady aerodynamics of conventional and supercritical airfoils — conducted in the Ames 11 foot transonic wind tunnel [NASA-TM-81221] N80-33345
Experimental techniques in unsteady aerodynamics N80-33373
Flying qualities design criteria [AD-A088629] N80-33402
Experimental performance and analysis of 15.04-centimeter-tip-diameter, radial-inflow turbine with work factor of 1.126 and thick blading [NASA-TP-1730] N80-33410
Analytic theory of orbit contraction and ballistic entry into planetary atmospheres [NASA-CR-163627] N80-33448
A compendium of computational fluid dynamics at the Langley Research Center [NASA-TM-81877] N80-33716
AEROELASTICITY
Analysis and correlation of test data from an advanced technology rotor system — helicopter performance prediction [NASA-CR-152366] N80-33351
Loads calibrations of strain gage bridges on the DAST project Aeroelastic Research Wing (ARW-1) [NASA-TM-81889] N80-33393
AERONAUTICAL ENGINEERING
Aeronautical engineering: A continuing bibliography, supplement 125 [NASA-SP-7037(125)] N80-33336
Aircraft crash survival design guide. Volume 3: Aircraft structural crashworthiness [AD-A089104] N80-33365
Report on visit to Europe in May 1979, covering the 16th Meetings of the International Committee on Aeronautical Fatigue and Associated Visits [AD-A074292] N80-34339
AEROSOLS
An air-vapor-droplet local interaction model for spray units N80-33708
The extended Rayleigh theory of the oscillation of liquid droplets [AD-A088894] N80-33724
A sensitivity analysis of volcanic aerosol dispersion in the stratosphere — Mt. Fuego, Guatemala eruptions [NASA-CR-163606] N80-33926
Lung deposition of aerosols from industrial environments N80-33933
The determination of tin oxide in airborne dust N80-33944
International Conference on Air pollution, volume 4 N80-33954
Background aerosol concentrations for the Namib-Atlantic interface N80-33957
Electrostatic precipitation research in Japan [PB80-194137] N80-33975
A numerical study of the efficiency with which aerosol particles collide with simple planar ice crystals N80-33985
Aerosol modelling for optical weather [AD-A088583] N80-34034
AEROSPACE ENGINEERING
Polyimides: Thermally stable aerospace polymers [NASA-TM-81884] N80-33571
Implications of requiring new production of older aircraft types (less than 75,000 pounds) to meet amended noise standards [AD-A088577] N80-33967
AEROSPACE ENVIRONMENTS
Influence of the environmental conditions on a quartz resonator [RAE-LIB-TRANS-1897(5207)] N80-33673
Photovoltaic generators in space — conference proceedings, Heidelberg, 15-17 Apr. 1980 [ESA-SP-147] N80-33873
Potential use of terrestrial photovoltaics for future space solar arrays N80-33882
Diodes for space solar arrays — 200 micrometers thick N80-33887
Impact of terrestrial solar cell development on space applications N80-33893
Performance of the solar cell experiment on the NTS-2 satellite — navigation technology satellite N80-33895
A general purpose computer program to assist in the system design of a solar array N80-33899
Properties of solar generators with reflectors and radiators — in a space environment N80-33901
Bearing And Power Transfer Assembly (BAPTA) with rotary transformer N80-33902
Technology of elevated voltage solar arrays — 250 kW N80-33903
Extravehicular Crewman Work System (ECWS) study program. Volume 4: Program evolution [NASA-CR-163600] N80-34104
AEROSPACE MEDICINE
USSR Report: Space Biology and Aerospace Medicine, volume 14, no. 4, 1980 [JPRS-76415] N80-34058
Cardiorespiratory system reactions of cosmonauts to exercise following long-term missions aboard the Salyut 6 orbital station N80-34060
Reactions to LBNP test of the crew of the Salyut 5 orbital station N80-34061
Preflight distinctions of Staphylococcus aureus carriers among cosmonauts N80-34062
Static endurance of rats after flight aboard the Cosmos 936 biosatellite N80-34063
Morphological study of rat kidneys after flight aboard the Cosmos-936 biosatellite N80-34065
Morphological changes in rat lungs after flight aboard the Cosmos-936 biosatellite N80-34066
Template activity of chromatin DNA and the adenylate cyclase system of rat tissues following flight aboard the Cosmos-936 biosatellite N80-34067
The role of functional asymmetry of the central nervous system in pilot performance N80-34069
Distinctions of pilot motor activity in different piloting modes during landing approaches N80-34070
Aerospace medicine and biology. A continuing bibliography with indexes, supplement 210, September 1980 [NASA-SP-7011(210)] N80-34086
Data handling in the medical experiment of the Spacelab Preparatory Program ASSESS 2 [DFVLR-MITT-78-02] N80-34114
AEROSPACE TECHNOLOGY TRANSFER
Impact of terrestrial solar cell development on space applications N80-33893
AEROSPACE VEHICLES
A compilation of computer software programs available in the Flight Dynamics Laboratory, 1979 [AD-A089854] N80-34156
AFRICA
Low frequency sea level variability along the west coast of North America N80-34048
AFTERBODIES
Afterbody drag. Volume 3: Literature survey — bibliographies [AD-A089938] N80-33361
AGING (BIOLOGY)
Site index prediction tables for oak in northwestern West Virginia [PB80-189930] N80-33852
AGING (MATERIALS)
Time-temperature-stress capabilities of composite materials for advanced supersonic technology application, phase 1 [NASA-CR-159267] N80-33496
AGRICULTURE
The use of radiation temperature to detect water-stress in sugarcane crop — Brazil [INPE-1767-TDL/028] N80-33839
AGRISTARS PROJECT
A multispectral data simulation technique [E80-10311] N80-33830
Utilization of spectral-spatial information in the classification of imagery data [E80-10321] N80-33832
AH-1G HELICOPTER
A flight investigation of performance and loads for a helicopter with 10-64C main rotor blade sections [NASA-TM-81871] N80-33348
AIR
On the microwave interaction with matter and microwave breakdown of air [AD-A088936] N80-33858
AIR CARGO
Cargo Logistics Airlift Systems Study (CLASS). Volume 5: Summary [NASA-CR-159951] N80-33382
AIR FLOW
Measurement of turbine engine transient airflow in ground test facilities [AD-A088706] N80-33414
AIR INTAKES
Planum response to simulated disturbances of the model and fan inlet guide vanes in a transonic tunnel [NASA-TM-81869] N80-33418
AIR LAND INTERACTIONS
Orographic effects in planetary flows [GARP-PUBL-23] N80-33811
Structure, mechanism and prediction of orographically enhanced rain in Britain N80-33814
Mountain waves and momentum flux N80-33815
Modification of the boundary layer by orography N80-33816
Defining relationships between surface characteristics and actual evaporation rate [E80-10335] N80-33834
AIR MASSES
The perturbation of some atmospheric mechanisms by emissions from aircraft [AD-A089100] N80-33965
Medium-scale study of a waving cold front [BLL-TRANS-1453-(9022.549)] N80-34013
AIR NAVIGATION
RAMP: A fault tolerant distributed microcomputer structure for aircraft navigation and control [NASA-CR-163615] N80-33415
AIR POLLUTION
Determination of pollutant emissions characteristics of General Electric CF6-6 and CF6-50 model engines [AD-A088927] N80-33412
Potential of spark ignition engine, electronic engine and transmission control [PB80-192701] N80-33751
International Conference on Air Pollution, volume 1 [ISBN-0-7988-16651] N80-33929
A philosophy for clean air N80-33930
Clean air and health Britain in the 1970's N80-33931
Lung deposition of aerosols from industrial environments N80-33933
Methodology for the research of air pollution in urban areas N80-33934
The assessment of smoke emission from diesel-engined vehicles N80-33935

International conference on Air Pollution, volume 2 [ISBN-0-7988-1685-1] N80-33936
The prevention of dust emissions in South Africa by electrostatic precipitation N80-33937
Energy conservation-air pollution abatement project N80-33939
Current techniques for the elimination of airbourne mists and soluble solids N80-33940
Progress with a new velocity electric precipitator the Electro-Dynamic Venturo (EDV) N80-33941
A method for routine isokinetic dust sampling N80-33942
International Conference on Air Pollution, volume 3 [ISBN-0-7988-1685-1] N80-33943
An improved method for the determination of arsenic and its use for air pollution studies N80-33946
Remote sounding techniques applied to mesoclimate measurements N80-33948
Ambient air quality monitoring systems: State of the art N80-33958
Air Pollution control device configurations [PB80-113253] N80-33972
Assessment of H2S control technologies for geothermal power plants [PB80-193709] N80-33973
Stack gas reheat evaluation [PB80-196850] N80-33980
Fine particle emissions information system [PB80-195753] N80-33981
Engineering reference manual for coding NEDS (National Emissions Data System) and EIS/P and R (Emission Inventory Subsystem/Permits and Registration) forms [PB80-194865] N80-34269

AIR PURIFICATION
Electrostatic precipitation research in Japan [PB80-194137] N80-33975
Evaluation of solid adsorbents for collecting atmospheric chlorinated hydrocarbons [PB80-198526] N80-33978

AIR QUALITY
In situ ozone data for evaluation of the laser absorption spectrometer ozone remote sensor: 1979 southeastern Virginia urban plume study summer field program [NASA-TM-81831] N80-33928
International Conference on Air Pollution, volume 1 [ISBN-0-7988-1685] N80-33929
A philosophy for clean air N80-33930
Clean air and health Britain in the 1970's N80-33931
Collecting fly ash from low sulphur coals: An Overview of Australian experience N80-33932
Aspects of the interaction among some of the parameters of importance to pollution potential considerations N80-33949
Possibilities and limitations of different types of dispersion models with respect to air quality management N80-33959
Environmental air quality control from the inside looking out N80-33960
Sodar network support for LIRAQ utilization in conjunction with project MABLE [PB80-192909] N80-33977

AIR SAMPLING
International Conference on Air Pollution, volume 3 [ISBN-0-7988-1685-1] N80-33943
The determination of tin oxide in airborne dust N80-33944
Developments in industrial emission measurements: Progress towards an automated isokinetic sampler N80-33945
An improved method for the determination of arsenic and its use for air pollution studies N80-33946
Measurements of carbon monoxide in the southern hemisphere N80-33947

AIR TRAFFIC
Implications of requiring new production of older aircraft types (less than 75,000 pounds) to meet amended noise standards [AD-A088577] N80-33967

AIR TRAFFIC CONTROL
Test and evaluation of Texas instruments small community microwave landing system [AD-A088652] N80-33357
Spectrum resource assessment in the 2.7 to 2.9 GHz band. Phase 2: LSR deployment in the Los Angeles and San Francisco areas [PB80-194467] N80-33391
Development and test results of a flight management algorithm for fuel conservative descents in a time-based metered traffic environment [NASA-TP-1717] N80-33404

AIR WATER INTERACTIONS
Orographically controlled cross-equatorial flow N80-33821
Climatic maps of the sea surface-air difference in vapour pressure and in potential temperature over the eastern Indian Ocean [AD-A089022] N80-34060

AIRBORNE/SPACEBORNE COMPUTERS
Computer-supported access systems in space flight [DFVLR-MITT-79-02] N80-34115

AIRCRAFT ACCIDENT INVESTIGATION
Civil helicopter wire strike assessment study. Volume 1: Findings and recommendations [NASA-CR-152389] N80-33391

AIRCRAFT ACCIDENTS
Carbon fiber plume sampling for large scale fire tests at Dugway Proving Ground — fiber release during aircraft fires [NASA-CR-159215] N80-33492

AIRCRAFT CONFIGURATIONS
Flow visualization study of the F-14 fighter aircraft configuration [NASA-CR-163098] N80-33350
Special Course on Unsteady Aerodynamics [AGARD-R-679] N80-33363
Some introductory concepts based on the unsteady flow about circular cylinders N80-33364
A qualitative discussion of dynamic stall N80-33366
Method for inviscid subsonic flows about aircraft configurations N80-33368
Evaluation of laminar flow control system concepts for subsonic commercial transport aircraft [NASA-CR-159253] N80-33394
Application of advanced technologies to small, short-haul air transports [NASA-CR-152364] N80-33396

AIRCRAFT CONTROL
RAMP: A fault tolerant distributed microcomputer structure for aircraft navigation and control [NASA-CR-163615] N80-33415

AIRCRAFT DESIGN
Conceptual study of an advanced supersonic technology transport (AST-107) for transpacific range using low-bypass-ratio turbofan engines [NASA-TM-81872] N80-33342
Aircraft crash survival design guide. Volume 3: Aircraft structural crashworthiness [AD-A089104] N80-33385
Application of advanced technologies to small, short-haul air transports [NASA-CR-152364] N80-33396
Conceptual point design study of a new CTOL SETOLS CAS aircraft for 1995 IOC [AD-A088351] N80-33400
VASCOMP 2. The V/STOL aircraft sizing and performance computer program. Volume 6: User's manual, revision 3 [NASA-CR-163639] N80-33401
Flying qualities design criteria [AD-A088629] N80-33402

AIRCRAFT ENGINES
A feasibility study of a 3-D finite element solution scheme for aeroengine duct acoustics [NASA-CR-159359] N80-34216

AIRCRAFT EQUIPMENT
Installation of C-6533(XE-2)/ARC ICS in UH-1H helicopter [AD-A088708] N80-33650

AIRCRAFT FUEL SYSTEMS
Dynamic evaluation of experimental integral fuel-tank sealants, part 1 [AD-A088573] N80-33573

AIRCRAFT GUIDANCE
Synthesized voice approach callouts for air transport operations [NASA-CR-3300] N80-34096

AIRCRAFT HAZARDS
Carbon/graphite fiber risk analysis and assessment study: Assessment of risk to the Lockheed Model L-1011 commercial transport aircraft [NASA-CR-159201] N80-33487
Carbon/graphite fiber risk analysis and assessment study: An assessment of the risk to Douglas commercial transport aircraft [NASA-CR-159212] N80-33488

AIRCRAFT HYDRAULIC SYSTEMS
Cavitation damage mechanisms: Experimental study cavitation in a spool valve — components of aircraft hydraulic systems [AD-A083653] N80-33750

AIRCRAFT LANDING
Conceptual point design study of a new CTOL SETOLS CAS aircraft for 1995 IOC [AD-A088351] N80-33400
Distinctions of pilot motor activity in different piloting modes during landing approaches N80-34070

AIRCRAFT NOISE
Predicted airframe noise levels [NASA-TM-81849] N80-34218
Aircraft noise prediction program validation [NASA-CR-159333] N80-34219

AIRCRAFT PERFORMANCE
Role of unsteady aerodynamics in aircraft response N80-33371
Flying qualities design criteria [AD-A088629] N80-33402

AIRCRAFT PILOTS
Loss of consciousness in high performance fighters (what to do about it) N80-33341
Analysis of general aviation single-pilot IFR incident data obtained from the NASA aviation safety reporting system [NASA-TM-80206] N80-33384

AIRCRAFT SAFETY
Aviation safety: DC-10 crash of May 25, 1979 [GPO-54-572] N80-33383
Military weather calculations for the NATO theater: Weather and Warplanes 6 [AD-A088549] N80-34033

AIRCRAFT SPIN
Technical Review, volume 15, no. 1 [ISSUE-1] N80-33337
NASA general aviation stall/spin flight testing N80-33340
Rotary balance data for a typical single-engine general aviation design for an angle of attack range of 8 deg to 90 deg. 1: Low wing model C — wind tunnel tests [NASA-CR-3200] N80-33355

AIRCRAFT STABILITY
Experimental techniques in unsteady aerodynamics N80-33373
Longitudinal stability and control in wind shear with energy height rate feedback [NASA-TM-81829] N80-33416

AIRCRAFT STRUCTURES
Time-temperature-stress capabilities of composite materials for advanced supersonic technology application, phase 1 [NASA-CR-159267] N80-33496
Experimental investigation of the crack growth gage [AD-A089137] N80-33801

AIRFOILS
Circulation Control Wing (CCW) Flight Tests N80-33339
Experimental unsteady aerodynamics of conventional and supercritical airfoils — conducted in the Ames 11 foot transonic wind tunnel [NASA-TM-81221] N80-33345
Methods for inviscid subsonic flows about unsteady aerofoils N80-33375
Loads calibrations of strain gage bridges on the DAST project Aeroelastic Research Wing (ARW-1) [NASA-TM-81889] N80-33393

AIRFRAMES
Aircraft crash survival design guide. Volume 3: Aircraft structural crashworthiness [AD-A089104] N80-33385
Investigation of vibration reduction through structural optimization [AD-A088917] N80-33403
Predicted airframe noise levels [NASA-TM-81849] N80-34218

AIRGLOW
Spectroscopy of the Mars airglow from Mariner 9 ultraviolet spectrometer data N80-34317

AIRLINE OPERATIONS
Criteria for applying commercial aircraft warranties in USAF aircraft purchases [AD-A088774] N80-33343

Cargo Logistics Airlift Systems Study (CLASS). Volume 5: Summary
[NASA-CR-158951] N80-33362
Aviation safety: DC-10 crash of May 25, 1979
[GPO-54-572] N80-33383
Synthesized voice approach callouts for air transport operations
[NASA-CR-3300] N80-34088

AIRPORT SURFACE DETECTION EQUIPMENT
Spectrum resource assessment in the 2.7 to 2.9 GHz band. Phase 2: LSR deployment in the Los Angeles and San Francisco areas
[PB80-194457] N80-33391

ALBEDO
Defining relationships between surface characteristics and actual evaporation rate
[E80-10335] N80-33834

ALGEBRA
On the asymptotic analysis of Griffiths' period mapping N80-34174
Topics in analysis
[AD-A080463] N80-34189
The use of computers in solving mathematical problems. Citations from the NTIS data base
[PB80-813296] N80-34194

ALGORITHMS
Numerical method for predicting flow characteristics and performance of nonaxisymmetric nozzles. Part 2: Applications
[NASA-CR-3264] N80-33354
Development and test results of a flight management algorithm for fuel conservative descents in a time-based metered traffic environment
[NASA-TP-1717] N80-33404
Satellite communication performance evaluation: Computational techniques based on moments
[NASA-CR-163629] N80-33640
On the performance of explicit and implicit algorithms for transient thermal analysis
[NASA-TM-81880] N80-33715
Uncoupling approximation in fluid-structure interaction problems with cavitation
[AD-A088911] N80-33725
Development and evaluation of a prototype automated telephotometer system
[EPRI-EA-1434] N80-33731
Improved algorithm for calculation of UTM and geodetic coordinates — Jacobi elliptic functions
[NOAA-S/T-80-281] N80-33836
A method for edge detection in images of natural resources
[INPE-1768-RPE/154] N80-33840
Algorithm for extracting data from meteorological satellites for use in estimating precipitation
[INPE-1769-RPE/155] N80-34026
Tidal prediction program
[CSIR-SEA-8001] N80-34049
Identification of a nonlinear system by means of the modified GMDH
[BLL-TRANS-1446] N80-34135
Theory and design of unidirectional error codes N80-34141
The size of numbers in the analysis of certain algorithms N80-34142
Forward linear programming N80-34143
Simulation study of telephone traffic routing using learning algorithms, part 2
[S/IS-7907-PT-2] N80-34149
Learning algorithms for two person zero-sum stochastic games with incomplete information: A unified approach
[S/IS-7908] N80-34150
On the convergence of a block successive overrelaxation method for a class of linear complementarity problems
[AD-A088780] N80-34154
Flow control and routing algorithms for data networks
[AD-A088787] N80-34159
Advances in multicriteria engineering design: Computational techniques. Multiobjective engineering design via nonlinear goal programming
[AD-A088570] N80-34190
Structures and algorithms in stochastic realization theory and the smoothing problem
[AD-A088485] N80-34192
Strict chebyshev approximation of discrete data
[CSIR-TWISK-133] N80-34201
Consistency, redundancy and extension in fuzzy systems for regressive decision
[INPE-1950-RPE/207] N80-34210
Synthesis of generalized coherent optical processor
[AD-A088669] N80-34253

ALIGNMENT
TRISCAN: A method of precision antenna positioning N80-33444
Astronomical telescope for photons-gamma rays of low energy (approximately 4 MeV using the difference method like a Venetian blind
[INPE-1807-RPE/175] N80-34306

ALKALI HALIDES
The epitaxial polymerization of (SN)x N80-34264

ALKALI METAL COMPOUNDS
The action of water vapour on ion irradiated alkali silicate glasses
[AD-A089023] N80-33572

ALKANES
Large scale gas explosion experiments in Norway N80-33592
Superheating and boiling of water in hydrocarbons and of hydrocarbon mixtures N80-33709

ALLOCATIONS
Operational remote sensing legislation, part 1
[GPO-65-048] N80-34294
Operational remote sensing legislation, part 2
[GPO-52-581] N80-34295

ALPINE METEOROLOGY
Cyclogenesis in the lee of orography and its numerical modeling with special reference to the Alps N80-33818

ALPS MOUNTAINS (EUROPE)
Cyclogenesis in the lee of orography and its numerical modeling with special reference to the Alps N80-33818

ALTITUDE ACCLIMATIZATION
Effects of transmeridional flights and highland conditions on different forms of memory N80-34068

ALUMINATES
Ionic interactions in the liquid state by multinuclear magnetic resonance N80-33516

ALUMINUM
Mechanisms of erosion
[AD-A088571] N80-33498

ALUMINUM ALLOYS
Control of solidification structures and properties of industrial Al-Si alloys
[BLL-RTS-11916] N80-33544
Pilot plant forging of hydrogenated Ti-6Al-4V
[AD-A089107] N80-33558
Multi-parameter yield zone for predicting spectrum crack growth
[NASA-TM-81890] N80-33778
Positron annihilation gamma ray lineshape studies of defects in solids
[AD-A088856] N80-34257

ALUMINUM GALLIUM ARSENIDES
Mode structure of Al sub xGa sub 1-xAs injection lasers N80-33733
Performance of the solar cell experiment on the NTS-2 satellite — navigation technology satellite N80-33895

ALUMINUM OXIDES
Corrosion of fiber composites with aluminum alloy matrixes
[AD-A088564] N80-33583
The mechanical pretreatment of printed circuit boards
[BLL-RTS-12283] N80-33671
Study of high field effects in metal-aluminum oxide-silicon capacitors N80-33676

ALVEOLAR AIR
Human lung ventilation, mechanics and morphology N80-34085

AMIDES
LARC-13 adhesive development
[NASA-CR-159317] N80-33497

AMORPHOUS MATERIALS
Evaluation of amorphous ribbon reinforced resin matrix composites
[AD-A089102] N80-33501
Origin of magnetic properties in amorphous metals
[AD-A089145] N80-33560

AMPLIFIER DESIGN
High power millimeter wave amplifier
[AD-A088591] N80-33695

AMPLITUDES
Characterization of three types of silicon solar cells for SEPS Deep Space Mission. Volume 3: Current-voltage characteristics of spectrolab sculptured BSR/P+ (K7), BSR/P+ (K8.5) and BSR (K4.5) cells as a function of temperature and intensity
[NASA-TM-78305] N80-33863
Theoretical studies of solar oscillations
[NASA-CR-163611] N80-34326

ANAEROBES
Theoretical and applied aspects of the anabiosis of microorganisms
[BLL-RTS-12350] N80-34055

ANALOG DATA
Able image chain analysis. Revision
[AD-A088953] N80-33651

ANALOG TO DIGITAL CONVERTERS
The 1979 towed source experiment signal generator
[AD-A088757] N80-33659

ANALYSIS (MATHEMATICS)
Optimal controls that maximize the probability of being in a given set at a given time
[CSIR-TWISK-135] N80-34182
A mathematical approach to empirical astrophysics with applications N80-34308

ANALYSIS OF VARIANCE
An investigation of type 1 error rate for approximate F tests of linear combinations of mean squares N80-34175
Testing for equality of variance of correlated normal variables
[CSIR-TWISK-136] N80-34183

ANALYTIC GEOMETRY
Flows in the annular region when an underexpanded nozzle is exhausted into a stepped launch tube
[AD-A088581] N80-33477

ANALYTICAL CHEMISTRY
Development and application of analytical techniques to chemistry of donor solvent liquefaction
[DOE/PC-20041/T1] N80-33520
Polyfungin, a new antifungal antibiotic. 4: The use of thin layer chromatography for determining the qualitative composition of the polyfungin complex
[BLL-RTS-12381] N80-34054

ANALYZERS
A set of time varying television test patterns
[BBC-RD-1980/9] N80-33638

ANELASTICITY
Theoretical and numerical analyses of anelastic materials at finite strain N80-33761

ANGLE OF ATTACK
A comprehensive investigation into the supersonic viscous flow about a slender cone at high angle of attack: Experimental and theoretical results N80-33344
Experimental unsteady aerodynamics of conventional and supercritical airfoils — conducted in the Ames 11 foot transonic wind tunnel
[NASA-TM-81221] N80-33345
Rotary balance data for a typical single-engine general aviation design for an angle of attack range of 8 deg to 90 deg. 1: Low wing model C — wind tunnel tests
[NASA-CR-3200] N80-33355

ANIK 2
ANIK-B Doc communications system and ground terminals
[CRC-TN-704-E] N80-33649

ANISOTROPIC MEDIA
An accurate and computationally fast formulation for radiative fields and heat transfer in general, plane-parallel, non-grey media with anisotropic scattering N80-33713

ANISOTROPY
A precise measurement of the sidereal anisotropy of cosmic rays near 1500 GV N80-34336

ANNUAL VARIATIONS
In-flight characteristics of the topside ionospheric monitor (SSIE) on the DMSP satellite flight 2 and flight 4
[AD-A088879] N80-34005
Circulation seasons in the Northern Hemisphere and the changes in their duration in the twentieth century
[BLL-TRANS-1455-(9022.549)] N80-34014

ANNULAR FLOW
Flows in the annular region when an underexpanded nozzle is exhausted into a stepped launch tube
[AD-A088581] N80-33477

ANNULI
Flows in the annular region when an underexpanded nozzle is exhausted into a stepped launch tube [AD-A088581] N80-33477

ANODIC STRIPPING
Trace analysis of antimony by differential pulse anodic stripping voltammetry N80-33507

ANTENNA ARRAYS
Elementary patterns for large conformal arrays N80-33632
Optimal properties of the circular array for use as an adaptive antenna [AD-A088592] N80-33665

ANTENNA DESIGN
Precision I-band DME tests [AD-A089053] N80-33388
Elementary patterns for large conformal arrays N80-33632
Geometry of an antenna positioner for geostationary satellites [INPE-1795-NTE/161] N80-33646
Platform antennas for data collection [INPE-1820-RPE/186] N80-33647
Optimal properties of the circular array for use as an adaptive antenna [AD-A088592] N80-33665

ANTENNA RADIATION PATTERNS
Analytical compensation for near-field probe positioning errors in calculated far-field antenna patterns N80-33628
Elementary patterns for large conformal arrays N80-33632
A parametric analysis of performance characteristics of satellite-borne multiple-beam antennas [NASA-CR-163632] N80-33641
Effect of downlink phased array patterns on system availability contour predictions [AD-A088664] N80-33661
Optimal properties of the circular array for use as an adaptive antenna [AD-A088592] N80-33665

ANTIBIOTICS
Polyfungin, a new antifungal antibiotic. 4: The use of thin layer chromatography for determining the qualitative composition of the polyfungin complex [BLL-RTS-12381] N80-34054

ANTIFRICTION BEARINGS
Method of making bearing material [NASA-CASE-LEW-11930-3] N80-33482

ANTIMONY
Trace analysis of antimony by differential pulse anodic stripping voltammetry N80-33507

ANTIREFLECTION COATINGS
Development of a site-fabricated, building integrated air solar system [ALO-4123-5] N80-33913

APEXES
Power series expansion for a crossing-symmetric vertex function — the Green's function formulation of the many-body theory [CSIR-TWISK-134] N80-34182

APPROACH CONTROL
Test and evaluation of Texas Instruments small community microwave landing system [AD-A088852] N80-33367
Synthesized voice approach callouts for air transport operations [NASA-CR-3300] N80-34098

APPROXIMATION
Uncoupling approximation in fluid-structure interaction problems with cavitation [AD-A088911] N80-33725
Boundary approximation and time step control in iterative improvement for the numerical solution of partial differential equations N80-34170
Universal approximations of control systems over finite time N80-34208

AQUIFERS
Gravity geophysical dilineation of buried channel aquifers in the dissected till plains of northern Missouri [PB80-194343] N80-33851

ARCHITECTURE
Improving building construction specifications in state and local governments [NASA-CR-163623] N80-33612

ARCHITECTURE (COMPUTERS)
World progress in electronic switching. Part 2: Analysis of current trends — in microelectronics for data transmission [BLL-TRANS-3756-(7737.470)] N80-33670
Building block modeling methodology for composition of microprocessor-based digital systems N80-34109
A simulation facility for performance evaluation of shared-resource computer architectures N80-34110

ARIANE LAUNCH VEHICLE
SPOT solar array — for a three axis stabilized heliosynchronous satellite in an 800 km orbit N80-33880

ARID LANDS
The potential of energy farming in the southeastern California desert [PB80-195019] N80-33921

ARMED FORCES (UNITED STATES)
Criteria for applying commercial aircraft warranties in USAF aircraft purchases [AD-A088774] N80-33343

ARROW WINGS
Low-speed aerodynamic characteristics of a highly swept arrow wing configuration with several deflected leading edge concepts [NASA-TM-80180] N80-33347

ARSENIC
An improved method for the determination of arsenic and its use for air pollution studies N80-33945

ARTIFICIAL INTELLIGENCE
Artificial intelligence: Promises or results? [INPE-1834-RPE/196] N80-34164
Self-replicating systems: A systems engineering approach [NASA-TM-78304] N80-34209
Consistency, redundancy and extension in fuzzy systems for regressive decision [INPE-1850-RPE/207] N80-34210

ASHES
Operating experiences with improved rapping on electrostatic precipitators treating fly ash from high and low sulphur coals N80-33956

ASPHALT
Material characterization for studing flexible pavement behavior in fatigue and permanent deformation N80-33611

ASSAYING
Evaluation of in-line nondestructive assay systems [LA-8411-PR] N80-33755

ASSESS PROGRAM
Data handling in the medical experiment of the Spacelab Preparatory Program ASSESS 2 [DFVLR-MITT-78-02] N80-34114

ASTRODYNAMICS
Drag-free estimation feasibility study [NASA-CR-163635] N80-33454

ASTRONAUT MANEUVERING EQUIPMENT
Extravehicular Crewman Work System (ECWS) study program. Volume 1: Executive summary [NASA-CR-163597] N80-34101
Extravehicular Crewman Work System (ECWS) study program. Volume 3: Satellite service [NASA-CR-163599] N80-34103
Extravehicular Crewman Work System (ECWS) study program. Volume 4: Program evolution [NASA-CR-163600] N80-34104

ASTRONOMICAL TELESCOPES
An application of digital image techniques to the high-velocity material in NGC 1275 N80-34304

ASTROPHYSICS
A mathematical approach to empirical astrophysics with applications N80-34308
Two astrophysical problems in late-type peculiar stars: Calcium in super-metal-rich stars; and carbon nitrogen and oxygen in weak G-band stars N80-34311

ASYMMETRY
The role of functional asymmetry of the central nervous system in pilot performance N80-34069

ASYMPTOTIC METHODS
RAMP: A fault tolerant distributed microcomputer structure for aircraft navigation and control [NASA-CR-163615] N80-33415
Asymptotic analysis of linear filtering problems N80-34177

ATLANTIC OCEAN
Investigations of medium wavelength magnetic anomalies in the eastern Pacific using Magsat data [E80-10334] N80-33833
Coastal currents: Study of a model applied to the coast of Rio Grande do Sul latitude 29 deg south to 35 deg south [INPE-1841-RPE/201] N80-33844

ATLAS CENTAUR LAUNCH VEHICLE
FLTSATCOM-D [NASA-NEWS-RELEASE-80-158] N80-33424
Launch mission summary: FLTSATCOM-D Atlas/Centaur-57 [NASA-TM-82213] N80-33452

ATMOSPHERES
The design and implementation of a computerized data reduction system [AD-A088734] N80-34007

ATMOSPHERIC ATTENUATION
Relationship between short and long term rainfall rates and its implication for the design of radio links [BLL-RDL-TRANS-3665-(7737.470)] N80-33643
Relativistic electron precipitation: An observational study N80-33827
Atmospheric solar absorption measurements in the 9 to 11 mu m region using a diode laser heterodyne spectrometer [NASA-TP-1726] N80-33998

ATMOSPHERIC BOUNDARY LAYER
Modification of the boundary layer by orography N80-33816

ATMOSPHERIC CHEMISTRY
The perturbation of some atmospheric mechanisms by emissions from aircraft [AD-A089100] N80-33965
Kinetic and photochemical data for atmospheric chemistry reactions of the nitrogen oxides [PB80-198799] N80-34009

ATMOSPHERIC CIRCULATION
Orographic effects in planetary flows [GARP-PUBL-23] N80-33811
Influence of orography on the atmospheric general circulation N80-33812
Orographically controlled cross-equatorial flow N80-33821
Orographic effects in the atmospheres of other planets — Viking Mars observations N80-33822
Circulation seasons in the Northern Hemisphere and the changes in their duration in the twentieth century [BLL-TRANS-1455-(9022.549)] N80-34014
A numerical simulation of the influence of heat and moisture fluxes upon mesoscale circulations N80-34015
Measurements of boundary layer flow over a forested mountain slope N80-34018
Changes in the potential for wind energy generation due to terrain modification of the boundary-layer flow N80-34020
Workshop for Forecasting Droughts in Northeast Brazil [INPE-1739-RPE/138] N80-34027
Wind shear detection with pulse Doppler radar [AD-A088576] N80-34032

ATMOSPHERIC COMPOSITION
Background aerosol concentrations for the Namib-Atlantic interface N80-33957
A study of ice nucleus concentrations in eastern New York State N80-34017

ATMOSPHERIC DIFFUSION
Dynamic transport of inert tracers by growing baroclinic and stationary planetary waves in the lower stratosphere of the Northern Hemisphere in winter N80-33986

ATMOSPHERIC ENTRY
Analytic theory of orbit contraction and ballistic entry into planetary atmospheres [NASA-CR-163627] N80-33448

ATMOSPHERIC IONIZATION
On the comet model of Biermann et al [INPE-1805-RPE/173] N80-34323

ATMOSPHERIC MODELS
Structure, mechanism and prediction of orographically enhanced rain in Britain N80-33814
Modification of the boundary layer by orography N80-33816
Cyclogenesis in the lee of orography and its numerical modeling with special reference to the Alps N80-33818
Laboratory studies of topographic effects in rotating and/or stratified fluids N80-33819
Atmospheric/ionospheric/magnetospheric h using the Chatanika radar [AD-A088915] N80-34004

Operational data handling: An essential need for the accurate determination of satellite orbits
[DFVLR-MITT-79-02] N80-34119

ATMOSPHERIC MOISTURE
Determination of atmospheric water vapor from dewpoint measurement
[PB80-197199] N80-34039

ATMOSPHERIC PRESSURE
Wave information study for United States coastlines. Report 1: Surface pressure field reconstruction for wave hindcasting purposes
[AD-A089150] N80-34029
Surface energy budget of the Tropical Pacific Ocean
[AD-A089148] N80-34030
NMC model performance in the Northeast Pacific
[PB80-196033] N80-34038

ATMOSPHERIC REFRACTION
Operational data handling: An essential need for the accurate determination of satellite orbits
[DFVLR-MITT-79-02] N80-34119

ATMOSPHERIC TEMPERATURE
Great Lakes degree-day and temperature summaries and norms, 1897 - 1977
[PB80-199977] N80-34040

ATMOSPHERIC TURBULENCE
The effect of turbulence on wave propagation in the atmosphere: Generation attenuation and scattering
N80-33629
Atmospheric variability and air-sea interaction
N80-34023

ATMOSPHERICS
An investigation of continuous phase frequency shift keying as a modulation on additive impulsive atmospheric noise channels N80-33633

ATOMIC COLLISIONS
Molecular beam chemiluminescent investigation of the inelastic collisions of rare gas metastable atoms
N80-34223
Inclusive study of 200 GeV/c pi-neon interactions
N80-34232
Low energy atomic collisions
[AD-A088748] N80-34234

ATOMIC EXCITATIONS
Atomic effects in nuclear reactions N80-34229

ATOMIC SPECTRA
Spatially resolved studies of flame and plasma as sources for atomic spectroscopy N80-33511
Studies in atomic absorption spectroscopy utilizing electrothermal atomization N80-33513
Research in general physics, plasma dynamics, and communication sciences and engineering
[RLE-PR-122] N80-34338

ATOMIC STRUCTURE
Localized atomic orbitals for atoms in molecules
N80-34225

ATOMIZING
Studies in atomic absorption spectroscopy utilizing electrothermal atomization N80-33513

ATOMS
Localized atomic orbitals for atoms in molecules
N80-34225

ATTACK AIRCRAFT
Criteria for applying commercial aircraft warranties in USAF aircraft purchases
[AD-A089774] N80-33343

ATTENUATION
Platform antennas for data collection
[INPE-1830-RPE/186] N80-33647
Effect of downlink phased array patterns on system availability contour predictions
[AD-A089884] N80-33661

AUDIOMETRY
Development and application of a brain stem audiometer N80-34086

AUDITORY FATIGUE
Development and application of a brain stem audiometer N80-34086

AUGER EFFECT
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23109/1] N80-33914

AURORAL IONIZATION
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 1: Optical auroral images and related direct measurements
[NASA-TM-81121] N80-33997

AUSTRALIA
Sea King Mk. 50 helicopter sonar dynamics study. A simplified control systems mathematical model
[AR-001-607] N80-33395

AUTOMATA THEORY
Automation literature: A brief review and analysis
[NASA-TM-81245] N80-34097
Application of a hierarchical structure stochastic learning automation
[S/IS-7906] N80-34151
Self-replicating systems: A systems engineering approach
[NASA-TM-78304] N80-34209

AUTOMATIC CONTROL
Automation of visual weather observations
[AD-A089881] N80-34037
Automation literature: A brief review and analysis
[NASA-TM-81245] N80-34097
Real-time telephone traffic simulation using learning automata routing
[S/IS-7909] N80-34148
Simulation study of telephone traffic routing using learning algorithms, part 2
[S/IS-7907-PT-2] N80-34149

AUTOMATIC FLIGHT CONTROL
Automated flight plan filing by simulated voice recognition
[AD-A089139] N80-34105

AUTOMATIC TEST EQUIPMENT
Validation of the operating and support cost model for avionics automatic test equipment (OSCATE)
[AD-A088725] N80-33419

AUTOMOBILE ENGINES
Methanol/ethanol/gasoline blend fuels demonstration with stratified charge engine vehicles
[PB80-192123] N80-33606

AUTOMOBILE FUELS
Preparation and stability of emulsions of methanol in automobile diesel oil
[CSIR-CENG-294] N80-33579

AUTOMOBILES
Potential of spark ignition engine, electronic engine and transmission control
[PB80-192701] N80-33751
Working group on fuel consumption targets
[NP-24333] N80-33910
Energy: Careful conservation or regulated waste — control of automobile exhaust emissions
N80-SGuv1

AUTOMORPHISMS
Generalized addition sets N80-34171

AUTOREGRESSIVE PROCESSES
A study of human throat-wall and vocal tract from input/output measurements N80-34091

AVALANCHES
A multi-step method for avalanche zone recognition and analysis — San Juan Mountains (co)
N80-33634

AVIONICS
Aviation safety: DC-10 crash of May 25, 1979
[GPO-54-572] N80-33383
Digital Avionics Information System (DAIS): Life cycle cost impact modeling system Reliability, Maintainability, and Cost Model (RMCM): User's guide
[AD-A089045] N80-33405
Validation of the operating and support cost model for avionics automatic test equipment (OSCATE)
[AD-A088725] N80-33419

AXES OF ROTATION
Geometry of an antenna positioner for geostationary satellites
[INPE-1795-NTE/161] N80-33648

AXIAL FLOW TURBINES
High bypass turbofan component development. Amendment 1: Small fan redesign
[AD-A089067] N80-33413
The aerodynamics of contra-rotating axial flow wind power turbines
[CSIR-ME-1638] N80-33869

AXISYMMETRIC FLOW
A study of hybrid computing techniques for transonic flow fields
[AD-A088682] N80-33360
Calculation of laminar heating rates on three-dimensional configurations using the axisymmetric analogue
[NASA-TP-1698] N80-33719

B

BACKSCATTERING
Radar waveform synthesis for target identification
[AD-A088673] N80-33680

BAFFLES
Baffle aperture design study of hollow cathode equipped ion thrusters
[NASA-CR-165164] N80-33476

BALL BEARINGS
Effect of cage design on characteristics of high-speed-jet-lubricated 35-millimeter-bore ball bearing — turbojet engines
[NASA-TP-1732] N80-33749
Special engineering services to establish inspection criteria for bearings to improve life prediction
[AD-A088765] N80-33754

BALLISTIC CAMERAS
Advanced electro-optical tracker/ranger
[AD-A089143] N80-34254

BANACH SPACE
Tensor products and Banach ideals of p-compact operators
[CSIR-TWISK-132] N80-34211

BAND STRUCTURE OF SOLIDS
Ion implantation of wide bandgap semiconductors
[AD-A089026] N80-34268

BARIUM COMPOUNDS
Spectral distributions 5: Visible spectra of standard and improved green flare compositions
[AD-A089055] N80-33597

BAROCLINIC WAVES
Dynamic transport of inert tracers by growing baroclinic and stationary planetary waves in the lower stratosphere of the Northern Hemisphere in winter
N80-33986
The detection of atmospheric gravity waves by means of the wave interaction experiment
N80-33989

BAROCLINITY
Numerical study of baroclinic instability
[NASA-CR-161560] N80-33992

BAROTROPIC FLOW
A numerical study of motion and spindown characteristics of an isolated cyclonic oceanic vortex
N80-34045

BARYONS
Effects of heavy particles at low energies
N80-34231

BASALT
Comparative petrology of the Apollo 11 mare basalt, part 1. The oxygen isotope geochemistry of the Abitibi greenstone belt, part 2
N80-34313

BATCH PROCESSING
Batch processing with the radiodine laser induced-fluorescence detector
[AD-A088773] N80-33968

BATHS
The determination of uni and tri valent gold in acid gold baths
[BLL-RTS-12157] N80-33504
The use of glucorates for electrolytic and current-less metal depositing
[BLL-RTS-11997] N80-33530

BAYS (TOPOGRAPHIC FEATURES)
Assessment of alternative strategies for sludge disposal into deep ocean basins off southern California
[PB80-192990] N80-33971

BEAM CURRENTS
Local response of ITO/polysilicon solar cells
N80-33855
Steady state treatment of relativistic electron beam erosion
[AD-A089047] N80-34237

BEAM PLASMA AMPLIFIERS
Baffle aperture design study of hollow cathode equipped ion thrusters
[NASA-CR-165164] N80-33476

BEAMS (RADIATION)
Vector-potential flow in relativistic beam diodes
[AD-A089135] N80-33694
Oscillatory beam quality effects in modular high energy laser systems
[AD-A088655] N80-33736
Non-specular ultrasonic bounded beam transmission through solid plates N80-34214
Collimated beam manifold and method for using the same — laser beams
[NASA-CASE-MFS-25312-1] N80-34251

BEAMS (SUPPORTS)
A study of the magnitude and distribution of the stresses in the end-block of a post-tensioned prestressed concrete beam N80-33771
BEARINGS
Method of making bearing material [NASA-CASE-LEW-11930-3] N80-33482
Effect of surface ellipticity on dynamically loaded spherical and cylindrical joints and bearings N80-33788
BED REST
Some of the physiological effects of 30 day bed rest with the body in different positions N80-34073
BEDROCK
Contributions of LANDSAT imagery to the geological mapping of the Rio do Grande Sul Shield — Brazil [INPE-1838-RPE/199] N80-33842
Gravity geophysical dilineation of buried channel aquifers in the dissected till plains of northern Missouri [PB80-194343] N80-33851
BEDS (GEOLOGY)
Properties of the oceans reflected in the sea-bed distribution of quaternary planktonic Foraminifera: Including a study of the limits of empirical Paleo-Oceanographic models and the recognition and interpretation of faunal assemblages lacking modern counterparts N80-34047
BENDING
Generalized ray tracing, generalized bending and use of caustic surfaces as merit functions in optical design N80-34247
BENZENE
Distribution of benzene in tissues of hypokinetic animals N80-34083
BIBLIOGRAPHIES
Aeronautical engineering: A continuing bibliography, supplement 125 [NASA-SP-7037(125)] N80-33336
Afterbody drag. Volume 3: Literature survey — bibliographies [AD-A088938] N80-33361
Tropospheric scatter communications. Citations from the NTIS data base [PB80-812571] N80-33386
Inertial navigation and guidance. Citations from the NTIS data base [PB80-812415] N80-33389
Omega navigation system. Citations from the NTIS data base [PB80-812712] N80-33390
IMP-8. Volume 2: Scientific section — Bibliography [NASA-CR-160024] N80-33451
Hydrogen use as a fuel. Citations from the NTIS data base [PB80-813090] N80-33807
Mathematical analysis of stress cracks. Citations from the NTIS data base [PB80-813447] N80-33809
Battery electrolytes. Citations from the NTIS data base [PB80-808629] N80-33915
Battery electrolytes. Citations from the Engineering Index data base [PB80-808637] N80-33916
State-of-the-art reviews and bibliographies on energy. Citations from the NTIS data base [PB80-812886] N80-33917
State-of-the-art reviews and bibliographies on energy. Citations from the NTIS data base [PB80-812894] N80-33918
Lead batteries. Citations from the NTIS data base [PB80-813363] N80-33923
Lead batteries. Citations from the Engineering Index data base [PB80-813371] N80-33924
Ocean wave sensing. Citations from the NTIS data base [PB80-812978] N80-34053
Human acclimation and acclimatization to heat: A compendium of research, 1968-1978 — Bibliography [NASA-TM-81181] N80-34056
Aerospace medicine and biology. A continuing bibliography with indexes, supplement 210, September 1980 [NASA-SP-7011(210)] N80-34088
Publications of the exobiology program for 1979: A special bibliography [NASA-TM-82182] N80-34106
Microcomputers: Telecommunication applications. Citations from the NTIS data base [PB80-812698] N80-34126
Microcomputers: Telecommunication applications. Citations from the Engineering Index data base [PB80-812696] N80-34127
Microcomputers: General applications. Citations from the NTIS data base [PB80-812597] N80-34128
Microcomputers: General applications. Citations from the NTIS data base [PB80-812605] N80-34129
Microcomputers: Design and software development. Citations from the NTIS data base [PB80-812613] N80-34130
Microcomputers: Design and software development. Citations from the NTIS data base [PB80-812621] N80-34131
Microcomputers: General applications. Citations from the NTIS data base [PB80-812639] N80-34132
Microcomputers: Basic design and development. Citations from the NTIS data base [PB80-812654] N80-34133
A compilation of computer software programs available in the Flight Dynamics Laboratory, 1979 [AD-A088854] N80-34156
The use of computers in solving mathematical problems. Citations from the NTIS data base [PB80-813298] N80-34194
NASA patent abstracts bibliography. A continuing bibliography with indexes, supplement 17, section 2, July 1980 [NASA-SP-7039(17)-SECTION-2] N80-34284
Technology Assessment. Citations from the NTIS data base [PB80-813165] N80-34299
Technology Assessment. Citations from the NTIS data base [PB80-813173] N80-34300
A bibliography of planetary geology principal investigators and their associates, 1979 - 1980 [NASA-TM-82180] N80-34301
BINARY DATA
Pulse codes for the transmission of binary data [BLL-TRANS-3784] N80-33637
BINARY SYSTEMS (MATERIALS)
Superheating and boiling of water in hydrocarbons and of hydrocarbon mixtures N80-33709
BIOASSAY
Preflight distinctions of Staphylococcus aureus carriers among cosmonauts N80-34062
Comparative study of effects of weightlessness and artificial gravity on density, ash, calcium and phosphorous content of calcified tissues N80-34064
Morphological study of rat kidneys after flight aboard the Cosmos-936 biosatellite N80-34065
Template activity of chromatin DNA and the adenylate cyclase system of rat tissues following flight aboard the Cosmos-936 biosatellite N80-34067
BIOASTRONAUTICS
Publications of the exobiology program for 1979: A special bibliography [NASA-TM-82182] N80-34106
BIOCHEMISTRY
Hygiene and toxicology of human waste gases N80-34059
BIODYNAMICS
Differences in certain physiological, biomechanical, and subjective measures of work effect between males and females while backpacking N80-34089
A comprehensive model for human motion simulations and its application to the take-off phase of the long jump [CSIR-TWISK-131] N80-34147
BIOELECTRICITY
Analysis of changes in evoked bioelectrical activity of the brain during exposure to high-intensity stationary magnetic field N80-34082
BIOINSTRUMENTATION
Lung deposition of aerosols from industrial environments N80-33933
BIOLOGICAL EFFECTS
Proceedings of the Workshop on Government Oil Spill Modeling [NASA-CR-163640] N80-33979
Lesions to and recovery of mouse seminiferous epithelium after exposure to radiation at different dose rates N80-34079
The role of temperature in experiments on biological objects under extreme conditions N80-34080
Aerospace medicine and biology. A continuing bibliography with indexes, supplement 210, September 1980 [NASA-SP-7011(210)] N80-34088
BIOMASS ENERGY PRODUCTION
Evaluation of processes for producing gasoline from wood [DOE/PE-70048/T2] N80-33902
The potential of energy farming in the southeastern California desert [PB80-195019] N80-33921
BIOMEDICAL DATA
Effect of task variable interactions in lifting and lowering N80-34090
Data handling in the medical experiment of the Spacelab Preparatory Program ASSESS 2 [DFVLR-MITT-79-02] N80-34114
BIOSATELLITES
Static endurance of rats after flight aboard the Cosmos 936 biosatellite N80-34063
Micronuclei in rat bone marrow after flight aboard the Cosmos 936 biosatellite N80-34081
BIOTECHNOLOGY
Technology Assessment. Citations from the NTIS data base [PB80-813165] N80-34299
Technology Assessment. Citations from the NTIS data base [PB80-813173] N80-34300
BIREFRINGENT COATINGS
Birefringent coating technique, photoelastic stress analysis [AD-A088857] N80-33799
BIVARIATE ANALYSIS
Testing for equality of variance of correlated normal variables [CSIR-TWISK-136] N80-34183
Some screening procedures based on data from a singly truncated bivariate normal distribution N80-34200
BLACK HOLES (ASTRONOMY)
N-body simulations of stellar systems containing massive black holes N80-34309
BLACKOUT (PROPAGATION)
Solar-terrestrial predictions proceedings. Volume 4: Prediction of terrestrial effects of solar activity [PB80-200025] N80-34011
BLOOD VOLUME
Effect of antiorthostatic hypokinesia and space flight factors on change in leg volume N80-34072
BOATTAILS
Afterbody drag. Volume 3: Literature survey — bibliographies [AD-A088938] N80-33361
BODY MEASUREMENT (BIOLOGY)
New engineering approaches to noninvasive His-Purkinje system recordings N80-34087
BODY TEMPERATURE
Human acclimation and acclimatization to heat: A compendium of research, 1968-1978 — Bibliography [NASA-TM-81181] N80-34056
Circadian rythm of human body temperature in antiorthostatic position N80-34074
BOILERS
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 2: Residual-fired cogeneration process boiler [NASA-CR-159770-PT-2] N80-33861
BONE MARROW
Micronuclei in rat bone marrow after flight aboard the Cosmos 936 biosatellite N80-34081
BONE MINERAL CONTENT
Comparative study of effects of weightlessness and artificial gravity on density, ash, calcium and phosphorous content of calcified tissues N80-34064
BOOMS (EQUIPMENT)
Telescopic masts for deployment of flexible solar arrays N80-33881
BORDERS
A method for edge detection in images of natural resources [INPE-1768-RPE/154] N80-32240
BORIDES
Superconductivity, magnetism and structural study of some new ternary transition metal borides N80-33675

BORONHYDRIDES
Chemical nickel-plating with sodium borohydride. Process technology and properties of coats [BLL-RTS-12156] N80-33632
BORON
X-ray diffraction study of the structure of boron in vapor-deposited boron fibers N80-33484
BORON FIBERS
X-ray diffraction study of the structure of boron in vapor-deposited boron fibers N80-33484
BOUNDARY LAYER CONTROL
Evaluation of laminar flow control system concepts for subsonic commercial transport aircraft [NASA-CR-159253] N80-33394
BOUNDARY LAYER EQUATIONS
Analytical methods for prediction of unsteady turbulent boundary layers N80-33377
Calculation of laminar heating rates on three-dimensional configurations using the axisymmetric analogue [NASA-TP-1698] N80-33719
BOUNDARY LAYER FLOW
Viscous flow near a sphere under surface gravity waves N80-33701
Measurements of boundary layer flow over a forested mountain slope N80-34018
Changes in the potential for wind energy generation due to terrain modification of the boundary-layer flow N80-34020
BOUNDARY LAYER SEPARATION
Transonic shock wave - boundary layer interactions [AD-A088031] N80-33359
A qualitative discussion of dynamic stall N80-33366
BOUNDARY LAYERS
Introduction to unsteady boundary layers N80-33365
Experimental techniques for unsteady boundary layers N80-33374
Analytical methods for prediction of unsteady laminar boundary layers N80-33376
A compendium of computational fluid dynamics at the Langley Research Center [NASA-TM-81877] N80-33716
BOUNDARY VALUE PROBLEMS
The use of sources and sinks in solving two-dimensional heat conduction problems with change of phase in arbitrary domains N80-33704
Mathematical modelling of two-phase flow oscillations N80-33707
Solution of enforced boundary motion in direct transient and harmonic problems N80-33708
Elastic plate vibrations by boundary integral equations. Part 1: Infinite plate [AD-A089105] N80-33806
A numerical boundary integral equation method for transient motions N80-34168
Boundary approximation and time step control in iterative improvement for the numerical solution of partial differential equations N80-34170
Boundary controllability of hyperbolic partial differential equations [CSIR-TWISK-126] N80-34180
Variational methods of convolution integral and of large spring constants: A numerical comparison [AD-A088902] N80-34193
BRAIN
The role of functional asymmetry of the central nervous system in pilot performance N80-34069
Analysis of changes in evoked bioelectrical activity of the brain during exposure to high-intensity stationary magnetic field N80-34082
BRAIN CIRCULATION
Mathematical simulation of the transport of oxygen and important metabolites in the human brain N80-34092
BRAIN STEM
Development and application of a brain stem audiometer N80-34086
BRAZIL
Telecommando transmission system for stratospheric balloons [INPE-1830-RPE/194] N80-33645
Platform antennas for data collection [INPE-1820-RPE/186] N80-33647
Development of a technique for determining natural radioactivity using slow-speed aircraft at low altitudes [INPE-1831-RPE/195] N80-33838
The use of radiation temperature to detect water-stress in sugarcane crop — Brazil [INPE-1767-TDL/026] N80-33839
Contributions of LANDSAT imagery to the geological mapping of the Rio do Grande Sul Shield — Brazil [INPE-1838-RPE/199] N80-33842
Coastal currents: Study of a model applied to the coast of Rio Grande do Sul latitude 29 deg south to 35 deg south [INPE-1841-RPE/201] N80-33844
Statistical relation between the solar cycle and drought in northeast Brazil [INPE-1839-RPE/200] N80-34024
Workshop for Forecasting Droughts in Northeast Brazil [INPE-1739-RPE/138] N80-34027
Measurements of secondary cosmic radiation aboard a jet aircraft at altitudes of 12 and 12.5 km over Boa Vista and Campinas [INPE-1808-RPE/176] N80-34337
BRIGHTNESS
Development and evaluation of a prototype automated telephotometer system [EPRI-EA-1434] N80-33731
BRIGHTNESS TEMPERATURE
The use of radiation temperature to detect water-stress in sugarcane crop — Brazil [INPE-1767-TDL/026] N80-33839
BROADBAND
Spatial pulse compression [AD-A084750] N80-33660
BUBBLES
Evaluation of the effects of detonation in a spherical bomb N80-33594
BUFFER STORAGE
Flow control and routing algorithms for data networks [AD-A088767] N80-34159
BUILDINGS
Improving building construction specifications in state and local governments [NASA-CR-163623] N80-33612
BURNING RATE
Experimental determination of the admittances of solid propellants by the impedance tube technique N80-33484
The burning velocity inside a spark-ignition engine with different turbulent promoters N80-33746
BYPASSES
High bypass turbofan component development. Amendment 1: Small fan redesign [AD-A089067] N80-33413

C

CADMIUM ALLOYS
Effect of multiple shot peening/cadmium plating on high strength steel [AD-A088667] N80-33561
CADMIUM TELLURIDES
Electrochemically deposited cadmium telluride films and their application to solar cells N80-33853
CALCIUM CARBONATES
Origin and occurrence of selected world wide calcrete deposits N80-33984
CALCULUS OF VARIATIONS
Variational methods of convolution integral and of large spring constants: A numerical comparison [AD-A088902] N80-34193
CALIBRATING
Loads calibrations of strain gage bridges on the DAST project Aeroelastic Research Wing (ARW-1) [NASA-TM-81869] N80-33393
ORION S-band data acquisition for S-Y calibration — radio interferometer networks N80-33432
In situ ozone data for evaluation of the laser absorption spectrometer ozone remote sensor: 1979 southeastern Virginia urban plume study summer field program [NASA-TM-81831] N80-33929
An improved six-port technique for measuring complex reflection coefficient N80-34249
CALIFORNIA
The potential of energy farming in the southeastern California desert [PB80-195019] N80-33921
CANALS
Explosion hazards in the Suez Canal: An overview N80-33584
CANONICAL FORMS
Some problems of practical nomography [BLL-RTS-11700] N80-34167
CANOPIES (VEGETATION)
A model of plant canopy polarization response [E80-10306] N80-33835
CAPACITORS
Study of high field effects in metal-aluminum oxide-silicon capacitors N80-33676
CARBON COMPOUNDS
Difficult gas-chromatographic separations: Isotopic fractionations and extracts of carbonaceous materials N80-33510
CARBON DIOXIDE
Mathematical simulation of the transport of oxygen and important metabolites in the human brain N80-34092
CARBON DIOXIDE LASERS
The effects of laser radiation on pyrolytic silicon nitride coatings on slip-cast fused silica substrates [AD-A089130] N80-33738
CARBON FIBERS
Carbon/graphite fiber risk analysis and assessment study: Assessment of risk to the Lockheed Model L-1011 commercial transport aircraft [NASA-CR-159201] N80-33487
Carbon/graphite fiber risk analysis and assessment study: An assessment of the risk to Douglas commercial transport aircraft [NASA-CR-159212] N80-33488
Experimental and analytical studies for the NASA carbon fiber risk assessment [NASA-CR-159214] N80-33490
Electronic equipment vulnerability to fire released carbon fibers [NASA-TM-80219] N80-33491
Carbon fiber plume sampling for large scale fire tests at Dugway Proving Ground — fiber release during aircraft fires [NASA-CR-159215] N80-33492
Process modifications for improved carbon fiber composites: Alleviation of the electrical hazards problem [NASA-CR-163631] N80-33494
Catalytic incineration of graphite fibers in a graphite-epoxy composite fire [AD-A088897] N80-33503
CARBON MONOXIDE
Measurements of carbon monoxide in the southern hemisphere N80-33947
CARBON STARS
Spectra of late-type stars in the one to four micron region N80-34302
A deep near-infrared objective-prism survey for carbon stars toward the galactic center and anticenter N80-34305
CARBON-CARBON COMPOSITES
Carbon/graphite fiber risk analysis and assessment study: Assessment of risk to the Lockheed Model L-1011 commercial transport aircraft [NASA-CR-159201] N80-33487
Carbon/graphite fiber risk analysis and assessment study: An assessment of the risk to Douglas commercial transport aircraft [NASA-CR-159212] N80-33488
CARBONATES
Carbonate formation on Mars — environment simulation N80-34314
CARDIOLOGY
Effect of task variable interactions in lifting and lowering N80-34090
CARDIOVASCULAR SYSTEM
Cardiorespiratory system reactions of cosmonauts to exercise following long-term missions aboard the Salyut 6 orbital station N80-34060
Effect of periodic exposure to head-pelvis accelerations on a short-arm centrifuge on responses of the human cardiovascular system N80-34071
CARRIER DENSITY (SOLID STATE)
Solar cell modeling for computer-aided generator design and irradiation degradation computations N80-33896
CASCADE FLOW
Vibrations of several obstacles within the two dimensional flow of incompressible fluid N80-33614
CAST ALLOYS
The behavior of inmold deoxidation in steel castings N80-33550

CATALYSTS
Catalytic incineration of graphite fibers in a graphite-epoxy composite fire
[AD-A088897] N80-33503
CATALYTIC ACTIVITY
Fixation of Zn(ii) ions on metal oxide surfaces
[BLL-RTS-12200] N80-34262
CATHODE RAY TUBES
Users manual for the transparent touch sensitive cathode ray tube display overlay
[AD-A088839] N80-33891
CATHODES
Cathodic corrosion-protection in areas subject to explosion hazards
[BLL-T4934/BG/ERS/79(9022.048)] N80-33542
CATHODIC COATINGS
The interaction between pipe-coatings and cathodic corrosion-protection
[BLL-TRANS-T4943/BG/ERS/79] N80-33541
CAUSTIC LINES
Generalized ray tracing, generalized bending and use of caustic surfaces as merit functions in optical design N80-34247
CAUSTICS (OPTICS)
Generalized ray tracing, generalized bending and use of caustic surfaces as merit functions in optical design N80-34247
CAVITATION CORROSION
Metal surface damage due to cavitation erosion
[BLL-RTS-12269] N80-33543
CAVITATION FLOW
Uncoupling approximation in fluid-structure interaction problems with cavitation
[AD-A088911] N80-33725
Cavitation damage mechanisms: Experimental study cavitation in a spool valve — components of aircraft hydraulic systems
[AD-A083653] N80-33750
CAVITY RESONATORS
Analysis of unstable optical resonators
[AD-A088600] N80-34255
CEILINGS (METEOROLOGY)
A study of ice nucleus concentrations in eastern New York State N80-34017
Military weather calculations for the NATO theater: Weather and Warplanes 8
[AD-A088549] N80-34033
CENSORED DATA (MATHEMATICS)
Analysis of ordered and partially ordered categorical data N80-34196
CENTRIFUGING STRESS
Effect of periodic exposure to head-pelvis accelerations on a short-arm centrifuge on responses of the human cardiovascular system N80-34071
CHANNEL FLOW
A study of hybrid computing techniques for transonic flow fields
[AD-A088662] N80-33360
Reverse pseudo-unsteady aerodynamic calculation methods N80-33616
CHANNEL NOISE
Interfield hybrid coding of NTSC component video signals N80-33636
CHARACTER RECOGNITION
Reading handwritten words using hierarchical relaxation N80-34161
CHARGE COUPLED DEVICES
Single chip lenses for ultrasonic imaging
[AD-A088857] N80-34220
Meeting of the IRIS specialty group on infrared detectors, volume 1
[ERIM-139600-3-X(I)] N80-34241
An application of digital image techniques to the high-velocity material in NGC 1275 N80-34304
CHARGED PARTICLES
Atomic effects in nuclear reactions N80-34229
CHARTS
Tidal prediction program
[CSIR-SEA-8001] N80-34049
A cusum for a scale parameter — applications to quality control and regression analysis
[CSIR-TWISK-130] N80-34186
CHEBYSHEV APPROXIMATION
Strict chebyshev approximation of discrete data
[CSIR-TWISK-133] N80-34201
CHELATES
The use of gluconates for electrolytic and current-less metal depositing
[BLL-RTS-11907] N80-33530
CHEMICAL ANALYSIS
X-ray diffraction study of the structure of boron in vapor-deposited boron fibers N80-33494
Computer prediction of molecular weights from unknown mass spectra N80-33517
Development and application of analytical techniques to chemistry of donor solvent liquefaction
[DOE/PC-20041/T1] N80-33520
Characterization and theory of electrolyte-insulator-semiconductor field-effect transistor N80-33678
Source emission measurements of volatile organic chemicals
[PB80-198518] N80-33974
Meeting of the IRIS specialty group on infrared detectors, volume 1
[ERIM-139600-3-X(I)] N80-34241
Determination of surface active materials by square-wave polarography (polarography with rectangular wave)
[BLL-RTS-12170] N80-34243
CHEMICAL BONDS
The determination of uni and tri valent gold in acid gold baths
[BLL-RTS-12157] N80-33504
CHEMICAL COMPOSITION
The ONERA vacuum ultraviolet spectrograph and its use for the study of surface layers in titanium and its alloys N80-33617
Polyfungin, a new antifungal antibiotic. 4: The use of thin layer chromatography for determining the qualitative composition of the polyfungin complex
[BLL-RTS-12381] N80-34054
CHEMICAL ENGINEERING
Hydroprocessing of light pyrolysis fuel oil for kerosene type jet fuel
[AD-A089101] N80-33599
A methodology for logical design of databases for project engineering N80-34285
CHEMICAL EQUILIBRIUM
Ionic interactions in the liquid state by multinuclear magnetic resonance N80-33516
CHEMICAL EVOLUTION
Publications of the exobiology program for 1979: A special bibliography
[NASA-TM-82182] N80-34108
CHEMICAL FUELS
Thermal and electrostatic initiation of TiH/sub x based pyrotechnics
[MLM-2710(OP)] N80-33604
CHEMICAL LASERS
Oscillatory beam quality effects in modular high energy laser systems
[AD-A088655] N80-33736
Analysis of unstable optical resonators
[AD-A088600] N80-34255
CHEMICAL PROPERTIES
The revised organic chemical producers data base system
[PB80-199805] N80-34287
CHEMICAL REACTION CONTROL
Status of nickel-hydrogen cell technology N80-33474
CHEMICAL REACTIONS
Theoretical aspects of the mechanism of simple chemical reactions
[AD-A088904] N80-33481
Thermal and electrostatic initiation of TiH/sub x based pyrotechnics
[MLM-2710(OP)] N80-33604
Automatic flowsheet drawing for the computer aided design of chemical processes using interactive computer graphics N80-34144
Fixation of Zn(ii) ions on metal oxide surfaces
[BLL-RTS-12200] N80-34262
Carbonate formation on Mars — environment simulation N80-34314
CHEMICAL TESTS
Resistance to corrosion of chromated zinc coatings
[BLL-RTS-12304] N80-33536
TNT equivalency testing of chemical mixtures in continuous TNT manufacturing
[AD-A088903] N80-33600
CHEMILUMINESCENCE
Molecular beam chemiluminescent investigation of the inelastic collisions of rare gas metastable atoms N80-34223
CHIPS
Reasons for the occurrence of smooth work surfaces in metal cutting
[BLL-RTS-12078] N80-33743
CHIPS (ELECTRONICS)
Single chip lenses for ultrasonic imaging
[AD-A088857] N80-34220
CHLORODCARBONS
Evaluation of solid adsorbents for collecting atmospheric chlorinated hydrocarbons
[PB80-198526] N80-33978
CHROMATES
Resistance to corrosion of chromated zinc coatings
[BLL-RTS-12304] N80-33536
Chromating
[BLL-RTS-12344] N80-33540
CHROMIUM ALLOYS
Electron microscopical investigation on the age hardening of spring alloys based on Co-Ni-Cr-Fe
[BLL-RTS-12152] N80-33526
CHROMOSPHERE
Mesogranulation and supergranulation in the Sun N80-34325
CIRCADIAN RHYTHMS
Circadian rythm of human body temperature in antiorthostatic position N80-34074
CIRCUIT BOARDS
Regenerations of critical process solutions relative to recoveries of valuable substances
[BLL-RTS-12141] N80-33505
The mechanical pretreatment of printed circuit boards
[BLL-RTS-12263] N80-33671
CIRCUIT DIAGRAMS
Steady state spurious errors in shock-capturing numerical schemes
[KTH-AERO-TN-60] N80-33353
CIRCUITS
Intrinsic sources of IM generation
[AD-A088771] N80-33668
Impact oscillator waveguides
[INPE-1816-RPE/184] N80-33682
CIRCULAR CYLINDERS
Some introductory concepts based on the unsteady flow about circular cylinders N80-33364
Determining the form factors of plane and cylindrical surfaces by numerical methods
[INPE-1815-RPE/183] N80-34185
CIRCULAR PLATES
The forced oscillation of the circular plates
[BLL-RTS-12070] N80-33756
Finite circular plate on elastic foundation controlly loaded by rigid spherical indenter N80-33792
CIRCULAR TUBES
Dispersed flow heat transfer in circular tubes N80-33706
CITIES
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland
[E80-10228] N80-33829
Development of a technique for determining natural radioactivity using slow-speed aircraft at low altitudes
[INPE-1831-RPE/195] N80-33838
Methodology for the research of air pollution in urban areas N80-33934
CIVIL AVIATION
Civil helicopter wire strike assessment study. Volume 1: Findings and recommendations
[NASA-CR-152389] N80-33381
Test and evaluation of Texas Instruments small community microwave landing system
[AD-A088852] N80-33387
Automated flight plan filing by simulated voice recognition
[AD-A089138] N80-34105
CLASSIFICATIONS
Utilization of spectral-spatial information in the classification of imagery data
[E80-10321] N80-33832
Statistical classification of ice particles and raindrops by pattern recognition techniques N80-34021
CLEANERS
Cleaning agents and techniques for concentrating solar collectors
[SAND-79-7052] N80-33911

CLEANING
Bright dipping solution for iron-nickel-cobalt alloys [BLL-RTS-12183] N80-33529
The mechanical pretreatment of printed circuit boards [BLL-RTS-12260] N80-33671
CLEAR AIR TURBULENCE
Longitudinal stability and control in wind shear with energy height rate feedback [NASA-TM-81828] N80-33416
CLIMATE
Remote sounding techniques applied to mesoclimate measurements N80-33948
The Federal Plan for Meteorological Services and Supporting Research, fiscal year 1981 [PB80-189482] N80-34041
CLIMATOLOGY
Meteor and remote sensing satellites (a collection of articles) [NASA-TM-76369] N80-33453
Absorption equilibrium of solar radiation between the two hemispheres of Earth [INPE-1851-RPE/208] N80-33995
Circulation seasons in the Northern Hemisphere and the changes in their duration in the twentieth century [BLL-TRANS-1455-(9022.549)] N80-34014
Great Lakes degree-day and temperature summaries and norms, 1897 - 1977 [PB80-195877] N80-34040
CLOSED ECOLOGICAL SYSTEMS
Hygiene and toxicology of human waste gases N80-34059
CLOUD CHAMBERS
Homogeneous vapor phase nucleation of large polar molecules under Limiting experimental conditions: High temperatures, low pressures, and long growth times — cloud chamber studies N80-34224
CLOUD COVER
Meteor and remote sensing satellites (a collection of articles) [NASA-TM-76369] N80-33453
Absorption equilibrium of solar radiation between the two hemispheres of Earth [INPE-1851-RPE/208] N80-33995
CLOUD GLACIATION
Statistical classification of ice particles and raindrops by pattern recognition techniques N80-34021
CLOUD PHYSICS
Tropical cyclone genesis: Numerical modeling inferences N80-34016
A study of the microstructure of convective clouds: Observation and theory N80-34019
Statistical classification of ice particles and raindrops by pattern recognition techniques N80-34021
CLOUDS
Techniques for examining drop size spectra in water sprays and clouds [ARL/MECH-ENG-NOTE-375] N80-33721
CLOUDS (METEOROLOGY)
Orographic effects revealed by satellite pictures: Mesoscale flow phenomena N80-33820
COAL
Stack gas reheat evaluation [PB80-196850] N80-33980
COAL GASIFICATION
The pressurized fluidized bed gasification of coal char [BLL-RTS-12347] N80-33575
The fluidized bed gasification of coal char [BLL-RTS-12346] N80-33576
Modeling of heat and mass transfer during coal block gasification N80-33577
Single particle gas-solid reactions and their application to modeling of fluidized bed coal combustors and ash agglomerating gasifiers N80-33578
Coal gasification combined-cycle system analysis [EPRI-AP-1390] N80-33801
Energy policy: Supply and demand alternatives [GPO-56-541] N80-33870
COAL LIQUEFACTION
Development and application of analytical techniques to chemistry of donor solvent liquefaction [DOE/PC-20041/T1] N80-33520
Energy policy: Supply and demand alternatives [GPO-56-541] N80-33870
COAL UTILIZATION
The pressurized fluidized bed gasification of coal char [BLL-RTS-12347] N80-33575
Cogeneration Technology Alternatives Study (CTAS). Volume 4: Energy conversion systems [NASA-CR-159798] N80-33859
Collecting fly ash from low sulphur coals: An Overview of Australian experience N80-33932
Air Pollution control device configurations [PB80-193253] N80-33972
Health requirements for advanced coal extraction systems [NASA-CR-163265] N80-34093
COASTAL CURRENTS
Coastal currents: Study of a model applied to the coast of Rio Grande do Sul latitude 29 deg south to 35 deg south [INPE-1841-RPE/201] N80-33844
A two-dimensional diabatic isopycnal model of a coastal upwelling front N80-34043
The SWAB (Spectral Wave And Bar) program [PB80-196041] N80-34052
COASTAL WATER
Low frequency sea level variability along the west coast of North America N80-34046
Assessment of the role of remote sensing in the study of inland and coastal waters [NASA-TM-81881] N80-34048
COATING
Chemical nickel-plating with sodium borohydride. Process technology and properties of coats [BLL-RTS-12156] N80-33532
COBALT ALLOYS
Electron microscopical investigation on the age hardening of spring alloys based on Co-Ni-Cr-Fe [BLL-RTS-12152] N80-33526
COBOL
TANDEM 16, COBOL -T9201D00 [PB80-190293] N80-34134
CODERS
Interfield hybrid coding of NTSC component video signals N80-33836
CODING
Pulse codes for the transmission of binary data [BLL-TRANS-3784] N80-33837
Coding for spread spectrum packet radios [NASA-CR-163628] N80-33839
Theory and design of unidirectional error codes N80-34141
COGENERATION
Cogeneration Technology Alternatives Study (CTAS). Volume 4: Energy conversion systems [NASA-CR-159798] N80-33859
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 1: Coal-fired nocogeneration process boiler, section A [NASA-CR-159770-PT-1] N80-33860
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 2: Residual-fired nocogeneration process boiler [NASA-CR-159770-PT-2] N80-33861
COGNITION
Effects of criteria on flight simulation study 1: Heading deviation tolerance [AD-A088908] N80-33423
COGNITIVE PSYCHOLOGY
Effects of transmeridional flights and highland conditions on different forms of memory N80-34068
COHERENCE COEFFICIENT
Non-specular ultrasonic bounded beam transmission through solid plates N80-34214
COHERENT ACOUSTIC RADIATION
Non-specular ultrasonic bounded beam transmission through solid plates N80-34214
COHERENT RADAR
Research in aeronomy [NASA-CR-163810] N80-33996
COLD FRONTS
Medium-scale study of a waving cold front [BLL-TRANS-1453-(9022.549)] N80-34013
COLD HARDENING
Electron microscopical investigation on the age hardening of spring alloys based on Co-Ni-Cr-Fe [BLL-RTS-12152] N80-33526
COLD ROLLING
Analysis of residual stresses resulting from cold rolling of notches and their effect on fatigue behavior [AD-A088110] N80-33807
COLLIMATION
Collimated beam manifold and method for using the same — laser beams [NASA-CASE-MFS-25312-1] N80-34251
Astronomical telescope for photons-gamma rays of low energy (approximately 4 MeV using the difference method like a Venetian blind [INPE-1807-RPE/175] N80-34306
COLLOIDS
Studies of uniform spherical colloids prepared by emulsion polymerization N80-33568
COLOR TELEVISION
Alternatives for the development of future television systems [BLL-RTS-12332] N80-33626
DCT/DPCM processing of NTSC composite videosignal N80-33635
COLORADO
A multi-step method for avalanche zone recognition and analysis — San Juan Mountains (co) N80-33824
COLORIMETRY
Photometry and colorimetry of retroreflection: State-of-measurement-accuracy report [PB80-201783] N80-34256
COLUMNS (SUPPORTS)
Behavior classification of short reinforced concrete columns subjected to cyclic deformations N80-33774
COMBUSTION
Process modifications for improved carbon fiber composites: Alleviation of the electrical hazards problem [NASA-CR-163631] N80-33494
COMBUSTION CHAMBERS
Energy efficient engine [NASA-CR-159685] N80-33408
Experimental determination of the admittances of solid propellants by the impedance tube technique N80-33484
COMBUSTION PHYSICS
Conceptual model of turbulent flameholding for scramjet combustors [NASA-TP-1543] N80-33409
Single particle gas-solid reactions and their application to modeling of fluidized bed coal combustors and ash agglomerating gasifiers N80-33578
Oxygen/system gasification of wood [PNL-3353] N80-33605
COMBUSTION PRODUCTS
Collecting fly ash from low sulphur coals: An Overview of Australian experience N80-33932
The assessment of smoke emission from diesel-engined vehicles N80-33935
COMET TAILS
On the comet model of Biermann et al [INPE-1805-RPE/173] N80-34323
COMFORT
Passenger comfort technology for system decision making [NASA-TM-81875] N80-34096
COMMERCIAL AIRCRAFT
Criteria for applying commercial aircraft warranties in USAF aircraft purchases [AD-A088774] N80-33343
Evaluation of laminar flow control system concepts for subsonic commercial transport aircraft [NASA-CR-159253] N80-33394
COMMUNICATION
Experimental optical fiber communications link N80-33439
COMMUNICATION EQUIPMENT
Syncompex: A voice processing system for low cost HF radio telephony [CRC-1316-E] N80-33648
Microcomputers: Telecommunication applications. Citations from the NTIS data base [PB80-812688] N80-34126
Microcomputers: Telecommunication applications. Citations from the Engineering Index data base [PB80-812696] N80-34127
Microcomputers: Design and software development. Citations from the NTIS data base [PB80-812613] N80-34130
COMMUNICATION NETWORKS
The telecommunications and data acquisition report [NASA-CR-163608] N80-33427
DSN Ground Communications Facility N80-33434
The TRANSMIC system. 1: General principles and presentation [BLL-RDL-TRANS-3766-(7737.470)] N80-33623

The TRANSMIC system. 3: Operations, availability and quality of service
[BLL-RDL-TRANS-3765-(7737.470)] N80-33624
Coding for spread spectrum packet radios
[NASA-CR-163628] N80-33639
World progress in electronic switching. Part 2: Analysis of current trends — in microelectronics for data transmission
[BLL-TRANS-3756-(7737.470)] N80-33670
Flow control and routing algorithms for data networks
[AD-A088767] N80-34159

COMMUNICATION SATELLITES
Satnet development and operation. Pluribus satellite IMP development. Remote site maintenance. Internet development. Mobile Access Terminal Network, TCP for the HP 3000, TCP - TAC
[AD-A089025] N80-33456

COMMUNICATION THEORY
Simulation study of telephone traffic routing using learning algorithms, part 2
[S/IS-7907-PT-2] N80-34149
Research in general physics, plasma dynamics, and communication sciences and engineering
[RLE-PR-122] N80-34338

COMPILERS
TANDEM 16, COBOL -T9201D00
[PB80-190293] N80-34134
An analysis of Pascal programs and several basic block optimizations N80-34140

COMPLETENESS
Topics in model completeness of direct powers and direct products of theories N80-34169

COMPOSITE MATERIALS
Method of making bearing material
[NASA-CASE-LEW-11930-3] N80-33482
Experimental and analytical studies for the NASA carbon fiber risk assessment
[NASA-CR-159214] N80-33490
Influence of quality control variables on failure of graphite/epoxy under extreme moisture conditions
[NASA-TM-81246] N80-33493
Process modifications for improved carbon fiber composites: Alleviation of the electrical hazards problem
[NASA-CR-163631] N80-33494
Influence of stress interaction on the behavior of off-axis unidirectional composites
[NASA-CR-163618] N80-33495
Time-temperature-stress capabilities of composite materials for advanced supersonic technology application, phase 1
[NASA-CR-159267] N80-33496
Conduction heat transfer analysis in composite materials
[AD-A088741] N80-33499
Fatigue failure criteria for unidirectional fiber composites
[AD-A088733] N80-33500
Corrosion of fiber composites with aluminum alloy matrixes
[AD-A088564] N80-33563
Tackifier for addition polyimides
[NASA-TM-81883] N80-33570
Polyimides: Thermally stable aerospace polymers
[NASA-TM-81884] N80-33571
Localized impact problems of composite laminates N80-33759

COMPOSITE STRUCTURES
Analytical and numerical solutions for mass diffusion in a composite cylindrical body N80-33698

COMPRESSIBILITY
Some features of linear compressibility N80-33367

COMPRESSIBLE FLOW
WIND: Computer program for calculation of three dimensional potential compressible flow about wind turbine rotor blades
[NASA-TP-1729] N80-33357
Application of identical aerodynamic functions N80-33372
Computation of discrete hole film cooling flow
[AD-A088807] N80-33723

COMPUTATION
Satellite communication performance evaluation: Computational techniques based on moments
[NASA-CR-163629] N80-33640
Calculation of laminar heating rates on three-dimensional configurations using the axisymmetric analogue
[NASA-TP-1698] N80-33719
Errors in finite-difference computations on curvilinear coordinate systems
[NASA-CR-163601] N80-34176

COMPUTER ASSISTED INSTRUCTION
The self-training interpretive and retrieval system: Improved substructure perception N80-33509

COMPUTER COMPONENTS
Control means for a solid state crossbar switch
[NASA-CASE-NPO-15066-1] N80-33579

COMPUTER DESIGN
Advances in multicriteria engineering design: Computational techniques. Multiobjective engineering design via nonlinear goal programming
[AD-A088570] N80-34190

COMPUTER GRAPHICS
Users manual for the transparent touch sensitive cathode ray tube display overlay
[AD-A088939] N80-33691
Applications of computer-generated holograms in optical testing N80-33727
Design for the prevention of progressive collapse using interactive computer graphics N80-33767
A method for edge detection in images of natural resources
[INPE-1788-RPE/154] N80-33840
Automatic flowsheet drawing for the computer aided design of chemical processes using interactive computer graphics N80-34144

COMPUTER NETWORKS
Coupling of IBM and Siemens systems on RJE-basis as implemented in Regional Computer Center for the Mannheim and Heidelberg Universities
[DFVLR-MITT-78-02] N80-34120

COMPUTER PROGRAM INTEGRITY
Responsiveness and configuration control for embedded computer software
[AD-A088723] N80-34155

COMPUTER PROGRAMMING
The DSN programming system N80-33435
DSN system performance test software N80-33443
Investigation of electrodynamic stabilization and control of long orbiting tethers
[NASA-CR-161584] N80-33748
Tidal prediction program
[CSIR-SEA-8001] N80-34049
Contributions to the symposium: Computer Science in Space Flight — conference proceedings, Oberpfaffenhofen, West Germany, 19 Jan. 1978
[ESA-TT-587] N80-34112
Digital computers as components of complex systems
[DFVLR-MITT-78-02] N80-34113
Computer-supported access systems in space flight
[DFVLR-MITT-78-02] N80-34115
The use of computer-controlled manipulators in underwater technology
[DFVLR-MITT-78-02] N80-34117
Operational data handling: An essential need for the accurate determination of satellite orbits
[DFVLR-MITT-78-02] N80-34118
A language for designing software systems N80-34137
Programming alternatives for NC machines tools
[TSD-T-79106] N80-34163
Advances in multicriteria engineering design: Computational techniques. Multiobjective engineering design via nonlinear goal programming
[AD-A088570] N80-34190

COMPUTER PROGRAMS
Experimental unsteady aerodynamics of conventional and supercritical airfoils — conducted in the Ames 11 foot transonic wind tunnel
[NASA-TM-81221] N80-33345
WIND: Computer program for calculation of three dimensional potential compressible flow about wind turbine rotor blades
[NASA-TP-1729] N80-33357
VASCOMP 2. The V/STOL aircraft sizing and performance computer program. Volume 6: User's manual, revision 3
[NASA-CR-163639] N80-33401
Development and test results of a flight management algorithm for fuel conservative descents in a time-based metered traffic environment
[NASA-TP-1717] N80-33404
Digital Avionics Information System (DAIS): Life cycle cost impact modeling system Reliability, Maintainability, and Cost Model (RMCM): User's guide
[AD-A089045] N80-33405
RAMP: A fault tolerant distributed microcomputer structure for aircraft navigation and control
[NASA-CR-163615] N80-33415
Validation of the operating and support cost model for avionics automatic test equipment (OSCATE)
[AD-A088725] N80-33419
Synthesis methods applicable to SEM pole pair admittances
[AD-A088923] N80-33690
General nonlinear computer analysis of framed structures N80-33789
A sensitivity analysis of volcanic aerosol dispersion in the stratosphere — Mt. Fuego, Guatemala eruptions
[NASA-CR-163606] N80-33926
Voice response system statistics program, operational handbook
[AD-A089109] N80-34031
Automation of visual weather observations
[AD-A088881] N80-34037
The SWAB (Spectral Wave And Bar) program
[PB80-196041] N80-34052
Application of a computer programme for the determination of radioimmunological measured values
[BLL-RTS-12046] N80-34084
Description of a system for the interactive processing of the image data of a geostationary weather satellite
[DFVLR-MITT-78-02] N80-34116
Coupling of IBM and Siemens systems on RJE-basis as implemented in Regional Computer Center for the Mannheim and Heidelberg Universities
[DFVLR-MITT-78-02] N80-34120
An analysis of Pascal programs and several basic block optimizations N80-34140
Users' guide for the tabular display report generator program (TABDIS)
[NASA-TM-82211] N80-34146
Responsiveness and configuration control for embedded computer software
[AD-A088723] N80-34155
Artificial intelligence: Promises or results?
[INPE-1834-RPE/196] N80-34184
Universal approximations of control systems over finite time N80-34208
A feasibility study of a 3-D finite element solution scheme for aeroengine duct acoustics
[NASA-CR-159359] N80-34216
An evaluation of a computer code based on linear acoustic theory for predicting helicopter main rotor noise — CH-53A and S-76 helicopters
[NASA-CR-159339] N80-34217
Data recording and storage N80-34291
Sun Series program for the REEDA System — predicting orbital lifetime using sunspot values
[NASA-CR-161579] N80-34327

COMPUTER STORAGE DEVICES
Performance of computers with multiaccess memory N80-34107
Multiple Microprocessor System (MMS) design study, volume 2
[AD-A088086] N80-34160

COMPUTER SYSTEMS DESIGN
Computer prediction of molecular weights from unknown mass spectra N80-33517
Building block modeling methodology for composition of microprocessor-based digital systems N80-34109
SUMC fault tolerant computer system
[NASA-CR-161581] N80-34111
Contributions to the symposium: Computer Science in Space Flight — conference proceedings, Oberpfaffenhofen, West Germany, 19 Jan. 1978
[ESA-TT-587] N80-34112
Description of a system for the interactive processing of the image data of a geostationary weather satellite
[DFVLR-MITT-78-02] N80-34118

Coupling of IBM and Siemens systems on RJE-basis as implemented in Regional Computer Center for the Mannheim and Heidelberg Universities
[DFVLR-MITT-78-02] N80-34120

Use of the operating system OS-MVS in the technical and scientific field
[DFVLR-MITT-78-02] N80-34121

Experimental work place for the EBOSIPES research project
[DFVLR-MITT-78-02] N80-34122

Software for EBOSIPES: Present state and trends
[DFVLR-MITT-78-02] N80-34123

A language for designing software systems
N80-34137

A methodology for logical design of databases for project engineering N80-34285

Manual of documentation practices applicable to defense-aerospace scientific and technical information. Volume 2: Data recording and storage, mechanization systems and operations, announcement service and publications
[AGARD-AG-235-VOL-2] N80-34290

Mechanization systems and operations
N80-34292

An application of digital image techniques to the high-velocity material in NGC 1275 N80-34304

COMPUTER SYSTEMS PERFORMANCE

DSN system performance test software
N80-33443

A simulation facility for performance evaluation of shared-resource computer architectures N80-34110

Identification and analysis of simple models for the response time of complex computer systems
N80-34157

COMPUTER SYSTEMS PROGRAMS

Software for EBOSIPES: Present state and trends
[DFVLR-MITT-78-02] N80-34123

The use of PROINF in the research project EBOSIPES — project information system
[DFVLR-MITT-78-02] N80-34124

A graph theory approach to software evaluation
N80-34145

COMPUTER TECHNIQUES

The use of computers in solving mathematical problems. Citations from the NTIS data base
[PB80-813298] N80-34194

Verification of abstract types whose representations share storage N80-34283

COMPUTERIZED DESIGN

A modeling technique for design and simulation of hydrostatic journal bearings N80-33745

A general purpose computer program to assist in the system design of a solar array N80-33899

Automatic flowsheet drawing for the computer aided design of chemical processes using interactive computer graphics N80-34144

COMPUTERIZED SIMULATION

Investigation of vibration reduction through structural optimization
[AD-A088917] N80-33403

Development and test results of a flight management algorithm for fuel conservative descents in a time-based metered traffic environment
[NASA-TP-1717] N80-33404

Computer-aided analysis for the design of broad classes of microwave couplers, filters, and transmission lines
[AD-A088772] N80-33687

A modeling technique for design and simulation of hydrostatic journal bearings N80-33745

Equivalence techniques for vibration testing
N80-33760

A multispectral data simulation technique
[E80-10311] N80-33830

A simulation facility for performance evaluation of shared-resource computer architectures N80-34110

A formal program model for discrete event simulation and its use in the verification and validation of system models and implementations N80-34139

A comprehensive model for human motion simulations and its application to the take-off phase of the long jump
[CSIR-TWISK-131] N80-34147

A compilation of computer software programs available in the Flight Dynamics Laboratory, 1979
[AD-A088954] N80-34156

COMPUTERS

Data recording and storage N80-34291

CONCENTRATION (COMPOSITION)

The deposition of palladium coatings with low hydrogen content and stress in sulphuric acid electrolyte
[BLL-RTS-12267] N80-33534

Effects of flank protection media in the etching of copper — thiourea
[BLL-RTS-12359] N80-33639

Ion flotation studies and separation procedures for the platinum group metals N80-33545

Radiation-induced graft polymerization of styrene onto cellulose esters N80-33586

Vinyl acetate emulsion polymerization kinetics and mechanism N80-33567

Remote sounding techniques applied to mesoclimate measurements N80-33948

Aspects of the interaction among some of the parameters of importance to pollution potential considerations N80-33949

Background aerosol concentrations for the Namib-Atlantic interface N80-33957

Experimental studies of setting standard for optimum salt composition of portable water N80-34077

CONCENTRATORS

Thermal management for high power space platform systems N80-33472

Design data brochure for a pyramidal optical solar system
[NASA-CR-161202] N80-33865

An evaluation of spectrally selective reflectors (cold mirror membranes) for use with concentrator solar arrays N80-33900

Properties of solar generators with reflectors and radiators — in a space environment N80-33901

Cleaning agents and techniques for concentrating solar collectors
[SAND-79-7052] N80-33911

CONCORDE AIRCRAFT

Detection and assessment of secondary sonic booms in New England
[AD-A088160] N80-33362

CONCRETES

A study of the magnitude and distribution of the stresses in the end-block of a post-tensioned prestressed concrete beam N80-33771

Behavior classification of short reinforced concrete columns subjected to cyclic deformations
N80-33774

CONDENSING

A study of the microstructure of convective clouds: Observation and theory N80-34019

CONDUCTIVE HEAT TRANSFER

Conduction heat transfer analysis in composite materials
[AD-A088741] N80-33499

Turbulent heat transfer to liquid metals in a circular pipe N80-33705

CONFERENCES

Space shuttle solid rocket booster retrieval system: Five NOSC papers on space shuttle support
[AD-A089060] N80-33458

Synchronous Energy Technology
[NASA-CP-2154] N80-33465

Discussion on explosion hazards — conference proceedings, Goettingen, West Germany, 24 Aug. 1979
[MPIS-23/1979] N80-33582

La Recherche Aerospatiale, Bi-monthly Bulletin no. 1980-1
[ESA-TT-651] N80-33613

Ninth NASTRAN Users' Colloquium
[NASA-CP-2151] N80-33782

Photovoltaic generators in space — conference proceedings, Heidelberg, 15-17 Apr. 1980
[ESA-SP-147] N80-33873

International Conference on Air Pollution, volume 1
[ISBN-0-7988-1665-1] N80-33929

International conference on Air Pollution, volume 2
[ISBN-0-7988-1665-1] N80-33936

Solar-terrestrial predictions proceedings. Volume 4: Prediction of terrestrial effects of solar activity
[PB80-200025] N80-34011

Workshop for Forecasting Droughts in Northeast Brazil
[INPE-1738-RPE/138] N80-34027

Contributions to the symposium: Computer Science in Space Flight — conference proceedings, Oberpfaffenhofen, West Germany, 19 Jan. 1978
[ESA-TT-587] N80-34112

Meeting of the IRIS specialty group on infrared detectors, volume 1
[ERIM-139800-3-X(I)] N80-34241

Accuracy in powder diffraction: Proceedings of a symposium
[PB80-200488] N80-34272

Manual of documentation practices applicable to defense-aerospace scientific and technical information. Volume 2: Data recording and storage, mechanization systems and operations, announcement service and publications
[AGARD-AG-235-VOL-2] N80-34290

CONFIDENCE LIMITS

How near is a near-optimal solution: Confidence limits for the global optimum
[AD-A089108] N80-34203

CONGRESSIONAL REPORTS

Aviation safety: DC-10 crash of May 25, 1979
[GPO-54-572] N80-33383

Oversight: Alternate liquid fuels technology
[GPO-50-313] N80-33580

Oversight: Cost estimation techniques for emerging synthetic fuels technology, volume 9
[GPO-51-721] N80-33581

Energy policy: Supply and demand alternatives
[GPO-56-541] N80-33870

Incentives for energy conservation
[GPO-55-634] N80-33871

Oversight: Wind energy program
[GPO-51-982] N80-33872

Conservation and solar energy programs of the Department of Energy: A critique
[PB80-197759] N80-33922

The status of environmental economics: An update
[GPO-48-402] N80-33963

Low-level ionizing radiation
[GPO-50-084] N80-33964

Operational remote sensing legislation, part 1
[GPO-45-048] N80-34294

Operational remote sensing legislation, part 2
[GPO-52-581] N80-34295

CONSCIOUSNESS

Technical Review, volume 15, no. 1
[ISSUE-1] N80-33337

Loss of consciousness in high performance fighters (what to do about it) N80-33341

CONSERVATION LAWS

Conservation laws with dissipation
[AD-A088762] N80-34276

CONSTRUCTION

Improving building construction specifications in state and local governments
[NASA-CR-163623] N80-33612

CONTAMINANTS

The Transfer of Pollutants in Two Southern Hemispheric Oceanic Systems
[REPT-39] N80-33961

The revised organic chemical producers data base system
[PB80-199805] N80-34287

CONTINENTAL SHELVES

A model of wind-forced viscous circulation near coastal boundaries N80-34044

CONTINGENCY

Analysis of ordered and partially ordered categorical data N80-34196

CONTINUITY

A method for edge detection in images of natural resources
[INPE-1768-RPE/154] N80-33840

CONTROL

Control means for a solid state crossbar switch
[NASA-CASE-NPO-15066-1] N80-33679

CONTROL CONFIGURED VEHICLES

Across three (active control of space structures), phase 1
[AD-A089142] N80-33461

CONTROL SURFACES

Technical Review, volume 15, no. 1
[ISSUE-1] N80-33337

Circulation Control Wing (CCW) Flight Tests
N80-33339

CONTROL THEORY

Drag-free estimation feasibility study
[NASA-CR-163635] N80-33454

Flow control and routing algorithms for data networks
[AD-A088767] N80-34159

Statistical considerations in control models with applications
[AD-A088663] N80-34185
Universal approximations of control systems over finite time N80-34208
CONTROL VALVES
Cavitation damage mechanisms: Experimental study cavitation in a spool valve — components of aircraft hydraulic systems
[AD-A083653] N80-33750
CONVECTION CLOUDS
Tropical cyclone genesis: Numerical modeling inferences N80-34016
A study of the microstructure of convective clouds: Observation and theory N80-34019
CONVECTION CURRENTS
Theoretical studies of solar oscillations
[NASA-CR-163611] N80-34326
CONVECTIVE FLOW
Mathematical modeling of two-phase flow oscillations N80-33707
CONVECTIVE HEAT TRANSFER
Turbulent heat transfer to liquid metals in a circular pipe N80-33705
An investigation of the heat transfer at the liquid/solid interface of rapidly melting ice
[AD-A089099] N80-33722
Similitude modeling of natural convection heat transfer through an aperture in passive solar heated buildings
[LA-8365-T] N80-33726
CONVOLUTION INTEGRALS
Variational methods of convolution integral and of large spring constants: A numerical comparison
[AD-A088902] N80-34193
Wavefront deconvolution studies
[AD-A088548] N80-34278
COOLING SYSTEMS
Time series analysis of wind loadings on hyperbolic cooling towers N80-33772
COORDINATES
Impact of cell size on inventory and mapping errors in a cellular geographic information system
[E80-10315] N80-33831
Errors in finite-difference computations on curvilinear coordinate systems
[NASA-CR-163001] N80-34178
COPOLYMERIZATION
LARC-13 adhesive development
[NASA-CR-159317] N80-33497
COPPER
Trace analysis of antimony by differential pulse anodic stripping voltammetry N80-33507
The diffusion of copper into gold coatings at elevated temperatures
[BLL-RTS-12292] N80-33535
Effects of flank protection media in the etching of copper — thioureas
[BLL-RTS-12359] N80-33539
CORIOLIS EFFECT
Long wave trapping by a linear ridge topography
[AD-A088840] N80-34051
CORN
A model of plant canopy polarization response
[E80-10336] N80-33835
CORONAL HOLES
Correlation of high latitude coronal holes with solar wind streams high above or below the ecliptic
[AD-A087525] N80-34331
CORRELATION COEFFICIENTS
A method of correcting daily and monthly values of atmospheric precipitation and results of tests on it
[BLL-TRANS-1451-(9022.54B)] N80-34028
Some screening procedures based on data from a singly truncated bivariate normal distribution N80-34200
CORROSION
Corrosion of fiber composites with aluminum alloy matrixes
[AD-A088564] N80-33563
Lead batteries. Citations from the NTIS data base
[PB80-813363] N80-33923
Lead batteries. Citations from the Engineering Index data base
[PB80-813371] N80-33924
CORROSION PREVENTION
Chromating
[BLL-RTS-12344] N80-33540
The interaction between pipe-coatings and cathodic corrosion-protection
[BLL-TRANS-T4943/BG/ERS/79] N80-33541
Cathodic corrosion-protection in areas subject to explosion hazards
[BLL-T4934/BG/ERS/79(9022.048)] N80-33542
The action of water vapour on ion irradiated alkali silicate glasses
[AD-A089023] N80-33572
CORROSION RESISTANCE
Method of making bearing material
[NASA-CASE-LEW-11930-3] N80-33482
The use of current-less (chemical) nickel-plating in vacuum-and-precision- engineering
[BLL-RTS-12025] N80-33525
The diffusion of copper into gold coatings at elevated temperatures
[BLL-RTS-12292] N80-33535
Resistance to corrosion of chromated zinc coatings
[BLL-RTS-12304] N80-33536
Metal surface damage due to cavitation erosion
[BLL-RTS-12269] N80-33543
COSMIC PLASMA
IMP-8. Volume 2: Scientific section — Bibliography
[NASA-CR-160024] N80-33451
On the comet model of Biermann et al
[INPE-1805-RPE/173] N80-34329
COSMIC RAYS
Cosmic-ray produced radionuclides in extraterrestrial material — lunar samples, meteorites, and iron spherules in Pacific clay N80-34332
Cosmic ray propagation and instabilities N80-34334
A precise measurement of the sidereal anisotropy of cosmic rays near 1500 GV N80-34336
COSMONAUTS
Cardiorespiratory system reactions of cosmonauts to exercise following long-term missions aboard the Salyut 6 orbital station N80-34060
Reactions to LBNP test of the crew of the Salyut 5 orbital station N80-34061
Preflight distinctions of Staphylococcus aureus carriers among cosmonauts N80-34062
COSMOS 936 SATELLITE
Micronuclei in rat bone marrow after flight aboard the Cosmos 936 biosatellite N80-34061
COST ANALYSIS
Digital Avionics Information System (DAIS): Life cycle cost impact modeling system Reliability, Maintainability, and Cost Model (RMCM): User's guide
[AD-A089045] N80-33405
Validation of the operating and support cost model for avionics automatic test equipment (OSCATE)
[AD-A088725] N80-33419
Satellite Power Systems (SPS) concept definition study. Volume 2, part 2: System engineering — cost and programmatics
[NASA-CR-3319] N80-33869
The status of environmental economics: An update
[GPO-48-402] N80-33963
The use of PROINF in the research project EBOSIPES — project information system
[DFVLR-MITT-79-02] N80-34124
COST EFFECTIVENESS
Deep space network energy program N80-33446
COST REDUCTION
Selective electroplating processes
[BLL-RTS-11960] N80-33508
COUNTING
A one-pass method for counting range mean pair cycle for fatigue analysis
[ARL-STRUC-NOTE-454] N80-33781
CRACK INITIATION
A crack opening displacement approach to crack patching
[ARL/STRUC-NOTE-455] N80-33797
Note on the energy release rate for a crack starting from the apex of a wedge
[AD-A089116] N80-33805
CRACK PROPAGATION
Fatigue testing of vampire wings
[ARL/STRUC-REPT-378] N80-33399
Dynamic fractures in orthotropic fiber composites N80-33486
Correlation between segregation and cold cracking
[BLL-TRANS-4253-(9091.9F)] N80-33531
Fracture and flow of iron and its alloys: Theory and experiment N80-33554
Localized impact problems of composite laminates N80-33759
An analytical and experimental investigation of biaxial loading effects on cracks emanating from a circular hole N80-33762
The characterization of the crack growth behaviour of alloy IN-100 at elevated temperature under sustained load N80-33765
Three-dimensional finite element analysis of cyclic fatigue crack growth of multiple surface flaws N80-33788
Multi-parameter yield zone for predicting spectrum crack growth
[NASA-TM-81890] N80-33778
Some formulas for the crack opening stress level
[M-368] N80-33780
The stress-wave radiation from growing cracks
[ARL/MAT-REPT-112] N80-33796
The equilibrium field near the tip of a crack for finite plane strain of incompressible elastic materials
[AD-A088838] N80-33800
Experimental investigation of the crack growth gage
[AD-A089137] N80-33801
On the dynamic energy release rate in elastic crack propagation
[AD-A089119] N80-33802
The effect of surface energy on temperature rise around a fast running crack
[AD-A088756] N80-33804
CRACKING (FRACTURING)
Correlation between segregation and cold cracking
[BLL-TRANS-4253-(9091.9F)] N80-33531
Combined macroscopic and microscopic approach to the fracture of metals
[DOE/ER-10556/1] N80-33565
Special engineering services to establish inspection criteria for bearings to improve life prediciton
[AD-A088765] N80-33754
The Shock and Vibration Digest, volume 12, number 8
[AD-A088658] N80-33758
On Irwins and Achenbachs expressions for the energy release rate
[AD-A089118] N80-33803
CRACKS
A design study in crack patching
[ARL/STRUC-REPT-376] N80-33799
Mathematical analysis of stress cracks. Citations from the NTIS data base
[PB80-813447] N80-33809
CRASHES
Aviation safety: DC-10 crash of May 25, 1979
[GPO-54-572] N80-33383
Aircraft crash survival design guide. Volume 3: Aircraft structural crashworthiness
[AD-A089104] N80-33385
CRATERING
Mechanisms of erosion
[AD-A088571] N80-33498
CREEP PROPERTIES
Long-time creep behavior of the niobium alloy C-103
[NASA-TP-1727] N80-33555
Combined macroscopic and microscopic approach to the fracture of metals
[DOE/ER-10556/1] N80-33565
CREEP RUPTURE STRENGTH
Combined macroscopic and microscopic approach to the fracture of metals
[DOE/ER-10556/1] N80-33565
CRITERIA
Special engineering services to establish inspection criteria for bearings to improve life prediciton
[AD-A088765] N80-33754
CROP GROWTH
Workshop for Forecasting Droughts in Northeast Brazil
[INPE-1739-RPE/138] N80-34027
The Federal Plan for Meteorological Services and Supporting Research, fiscal year 1981
[PB80-199482] N80-34041
CROP IDENTIFICATION
A model of plant canopy polarization response
[E80-10336] N80-33835
CROSSED FIELDS
Microwave tubes
[AD-A088745] N80-33888

CRUDE OIL
Energy policy: Supply and demand alternatives [GPO-58-641] N80-33670
Incentives for energy conservation [GPO-55-634] N80-33671
CRUISE MISSILES
Design of a fiber optic data link for the Ground Launched Cruise Missile [AD-A086947] N80-34252
CRUSTAL FRACTURES
Fundamentals studies in geodynamics [NASA-CR-163620] N80-33693
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research [NASA-TM-82215] N80-33699
NASA plan for international crustal dynamics studies [NASA-TM-82214] N80-34000
CRYOGENICS
Superfluidity in 3He-4He mixture thin films N80-33809
CRYSTAL DISLOCATIONS
Local response of ITO/polysilicon solar cells N80-33895
CRYSTAL GROWTH
Crystallization under nonuniform conditions — in jet impingement N80-34256
CRYSTAL LATTICES
The diffusion of copper into gold coatings at elevated temperatures [BLL-RTS-12292] N80-33535
Study of strain distribution in helium implanted vanadium three silicon by the divergent X-ray beam method N80-33548
Accuracy in powder diffraction: Proceedings of a symposium [PB80-200498] N80-34272
CRYSTAL OSCILLATORS
Influence of the environmental conditions on a quartz resonator [RAE-LIB-TRANS-1997(5207)] N80-33673
CRYSTALLIZATION
Origin of magnetic properties in amorphous metals [AD-A089145] N80-33560
CRYSTALLOGRAPHY
Origin and occurrence of selected world wide calcrete deposits N80-33984
CURRENT DENSITY
The influence on the front metal coverage factor on the open-circuit voltage of silicon solar cells N80-33892
CURRENT DISTRIBUTION
Electroplating: Metal deposits by electrolysis, throwing power [BLL-RTS-11870] N80-33527
CYANIDES
Investigations into the distribution of the layer thickness produced by barrel electroplating in the case of cyanic silver plating [BLL-RTS-12294] N80-33536
CYCLES
A one-pass method for counting range mean pair cycle for fatigue analysis [ARL-STRUC-NOTE-454] N80-33781
CYCLIC LOADS
Behavior classification of short reinforced concrete columns subjected to cyclic deformations N80-33774
CYCLOGENESIS
Influence of orography on the atmospheric general circulation N80-33812
Cyclogenesis in the lee of orography and its numerical modeling with special reference to the Alps N80-33818
CYCLONES
Tropical cyclone genesis: Numerical modeling inferences N80-34016
NMC model performance in the Northeast Pacific [PB80-196033] N80-34038
A numerical study of motion and spindown characteristics of an isolated cyclonic oceanic vortex N80-34045
CYLINDRICAL BODIES
Analytical and numerical solutions for mass diffusion in a composite cylindrical body N80-33698
CYLINDRICAL SHELLS
Inelastic response of an infinite cylindrical shell to a transient acoustic wave [AD-A086597] N80-33808
CYTOLOGY
Tissue response to peritoneal implants [NASA-CR-159817] N80-33478
Cytochemical studies of planetary microorganisms explorations in exobiology [NASA-CR-163805] N80-34057
CZOCHRALSKI METHOD
Silicon germanium alloys for infrared detectors [AD-A086732] N80-33502

D

DAMAGE ASSESSMENT
Cavitation damage mechanisms: Experimental study cavitation in a spool valve — components of aircraft hydraulic systems [AD-A083653] N80-33750
A NASTRAN investigation of simulated projectile damage effects on a UH-1B tail boom model N80-33791
DAMPING
Solution sensitivity and accuracy study of NASTRAN for large dynamic problems involving structural damping N80-33785
DATA ACQUISITION
IBIG standard for pulse repetition frequencies and reference oscillator frequency for C-band radars [AD-A086545] N80-33666
A one-pass method for counting range mean pair cycle for fatigue analysis [ARL-STRUC-NOTE-454] N80-33781
Development of an automatic system for plotting synoptic charts [INPE-1786-RPE/158] N80-34025
Employment of a digital computer in the tests to ascertain the useful life of the thruster RIT 10 [DFVLR-MITT-78-02] N80-34125
DATA BASES
Application of thematic mapping techniques in terrain analysis [AD-A089081] N80-33847
Proceedings of the Workshop on Government Oil Spill Modeling [NASA-CR-163640] N80-33879
Fine particle emissions information system [PB80-195753] N80-33981
Workshop for Forecasting Droughts in Northeast Brazil [INPE-1739-RPE/138] N80-34027
Voice response system statistics program, operational handbook [AD-A089109] N80-34031
A methodology for logical design of databases for project engineering N80-34295
Database design: Choice of a methodology [CSIR-TWISK-102] N80-34296
The revised organic chemical producers data base system [PB80-199805] N80-34297
Environmental assessment data systems: Terminology reference manual [PB80-197916] N80-34298
Mechanization systems and operations N80-34292
DATA COLLECTION PLATFORMS
Data collection platforms: A technique for space telemetry applied to surveying ambient parameters [INPE-1743-RPE/139] N80-33459
DATA CORRELATION
Analysis and correlation of test data from an advanced technology rotor system — helicopter performance prediction [NASA-CR-152366] N80-33351
DATA LINKS
Experimental optical fiber communications link N80-33439
CPSK, DPSK, and FSK demodulator performance under nuclear stressed conditions [AD-A088364] N80-33685
Design of a fiber optic data link for the Ground Launched Cruise Missile [AD-A086947] N80-34252
DATA MANAGEMENT
Improvements in sparse matrix operations of NASTRAN N80-33784
DATA PROCESSING
RAMP: A fault tolerant distributed microcomputer structure for aircraft navigation and control [NASA-CR-163615] N80-33415
The DSN programming system N80-33435
High speed lookup table approach to radiometric calibration of multispectral image data [NASA-TP-1741] N80-33483
Digital image processing in ion microscope analysis: Methods of image quantification [AD-A086792] N80-33559
Impact of cell size on inventory and mapping errors in a cellular geographic information system [EIO-10315] N80-33831
Algorithm for extracting data from meteorological satellites for use in estimating precipitation [INPE-1769-RPE/155] N80-34026
Employment of a digital computer in the tests to ascertain the useful life of the thruster RIT 10 [DFVLR-MITT-78-02] N80-34125
DATA PROCESSING EQUIPMENT
Batch processing with the radioiodine laser induced-fluorescence detector [AD-A088773] N80-33968
A multi-site magnetotelluric measurement system with real time data analysis N80-33998
Microcomputers: Design and software development. Citations from the NTIS data base [PB80-812613] N80-34130
Microcomputers: Design and software development. Citations from the NTIS data base [PB80-812621] N80-34131
Microcomputers: General applications. Citations from the NTIS data base [PB80-812639] N80-34132
Microcomputers: Basic design and development. Citations from the NTIS data base [PB80-812654] N80-34133
DATA RECORDING
Data recording and storage N80-34291
DATA REDUCTION
Computer assisted performance tests of the Lyman Alpha Coronagraph [NASA-CR-163622] N80-33462
IBIG standard for pulse repetition frequencies and reference oscillator frequency for C-band radars [AD-A086545] N80-33666
Development of an automatic system for plotting synoptic charts [INPE-1786-RPE/158] N80-34025
DATA SMOOTHING
Two dimensional smoothing of a vector Laplacian random field with application to geodesy N80-33982
DATA STORAGE
Telematics and satellites. Part 1: Information systems [ESA-BR-04-PT-1] N80-33668
Verification of abstract types whose representations share storage N80-34283
Manual of documentation practices applicable to defense-aerospace scientific and technical information. Volume 2: Data recording and storage, mechanization systems and operations, announcement service and publications [AGARD-AG-235-VOL-2] N80-34290
Data recording and storage N80-34291
Announcement services and publications N80-34293
DATA SYSTEMS
Telematics and satellites. Part 1: Information systems [ESA-BR-04-PT-1] N80-33668
Data handling in the medical experiment of the Spacelab Preparatory Program ASSESS 2 [DFVLR-MITT-78-02] N80-34114
Identification of a nonlinear system by means of the modified GMDH [BLL-TRANS-1446] N80-34135
DATA TRANSMISSION
Tropospheric scatter communications. Citations from the NTIS data base [PB80-812571] N80-33386
The TRANSMIC system. 1: General principles and presentation [BLL-RDL-TRANS-3766-(7737.470)] N80-33623
The TRANSMIC system. 3: Operations, availability and quality of service [BLL-RDL-TRANS-3765-(7737.470)] N80-33624
Pulse codes for the transmission of binary data [BLL-TRANS-3784] N80-33637
Able image chain analysis. Revision [AD-A088853] N80-33651

Telematics and satellites. Part 1: Information systems
[ESA-BR-04-PT-1] N80-33668
World progress in electronic switching. Part 2: Analysis of current trends — in microelectronics for data transmission
[BLL-TRANS-3756-(7737.470)] N80-33670
Flow control and routing algorithms for data networks
[AD-A088767] N80-34159
DC 9 AIRCRAFT
Carbon/graphite fiber risk analysis and assessment study: An assessment of the risk to Douglas commercial transport aircraft
[NASA-CR-159212] N80-33488
DC 10 AIRCRAFT
Aviation safety: DC-10 crash of May 25, 1979
[GPO-54-572] N80-33383
Carbon/graphite fiber risk analysis and assessment study: An assessment of the risk to Douglas commercial transport aircraft
[NASA-CR-159212] N80-33488
DECAY
Radiative capture studies of the electromagnetic decays of highly excited states
[DOE/ER-01388/443] N80-33667
DECAY RATES
Long wave trapping by a linear ridge topography
[AD-A088840] N80-34051
DECISION MAKING
Effects of criteria on flight simulation study 1: Heading deviation tolerance
[AD-A088908] N80-33423
The status of environmental economics: An update
[GPO-48-402] N80-33953
Passenger comfort technology for system decision making
[NASA-TM-81875] N80-34096
A descriptive approach to multiple-criteria decision making
[CSIR-TWISK-128] N80-34281
DECISION THEORY
Consistency, redundancy and extension in fuzzy systems for regressive decision
[INPE-1850-RPE/207] N80-34210
DEEP SPACE
Characterization of three types of silicon solar cells for SEPS Deep Space Mission. Volume 3: Current-voltage characteristics of spectrolab sculptured BSR/P+ (K7), BSR/P+ (K6.5) and BSR (K4.5) cells as a function of temperature and intensity
[NASA-TM-78305] N80-33863
DEEP SPACE NETWORK
The telecommunications and data acquisition report
[NASA-CR-163608] N80-33427
Network functions and facilities N80-33433
DSN Ground Communications Facility N80-33434
The DSN programming system N80-33435
Planning a DSN support section technical library N80-33436
Noise adding radiometer performance analysis N80-33441
Networks consolidation program N80-33442
DSN system performance test software N80-33443
TRISCAN: A method of precision antenna positioning N80-33444
Planetary radar N80-33445
Deep space network energy program N80-33446
DEFECTS
Influence of quality control variables on failure of graphite/epoxy under extreme moisture conditions
[NASA-TM-81245] N80-33493
Special engineering services to establish inspection criteria for bearings to improve life prediction
[AD-A088765] N80-33754
Positron annihilation gamma ray lineshape studies of defects in solids
[AD-A088656] N80-34267
DEFENSE INDUSTRY
Criteria for applying commercial aircraft warranties in USAF aircraft purchases
[AD-A088774] N80-33343
DEFLECTION
Vibrations of several obstacles within the two dimensional flow of incompressible fluid N80-33614
Generalized ray tracing, generalized bending and use of caustic surfaces as merit functions in optical design N80-34247
DEFORMATION
Surface oxide softening in tungsten N80-33549
Mechanisms responsible for topographical changes in PLT stainless steel and graphite limiters
[PPPL-1671] N80-33564
DEGREES OF FREEDOM
Analysis of in-line flow-induced vibrations using linearization methods N80-33710
DELTA LAUNCH VEHICLE
Launch mission summary and terminal countdown, Delta 153 Satellite Business Systems satellite (SBS-A)
[NASA-TM-82212] N80-33455
DEMAND (ECONOMICS)
Energy policy: Supply and demand alternatives
[GPO-56-541] N80-33870
DEMODULATORS
CPSK, DPSK, and FSK demodulator performance under nuclear stressed conditions
[AD-A088364] N80-33685
DENSITY (MASS/VOLUME)
Comparative study of effects of weightlessness and artificial gravity on density, ash, calcium and phosphorous content of calcified tissues N80-34084
DEOXIDIZING
The mechanical pretreatment of printed circuit boards
[BLL-RTS-12263] N80-33671
DEOXYRIBONUCLEIC ACID
Template activity of chromatin DNA and the adenylate cyclase system of rat tissues following flight aboard the Cosmos-936 biosatellite N80-34067
DEPERSONALIZATION
Automation of visual weather observations
[AD-A088881] N80-34037
Automation literature: A brief review and analysis
[NASA-TM-81245] N80-34097
DEPOSITION
The use of current-less (chemical) nickel-plating in vacuum-and-precision- engineering
[BLL-RTS-12025] N80-33525
Origin and occurrence of selected world wide calcrete deposits N80-33984
DESIGN ANALYSIS
Experimental performance and analysis of 15.04-centimeter-tip-diameter, radial-inflow turbine with work factor of 1.126 and thick blading
[NASA-TP-1730] N80-33410
A design study in crack patching
[ARL/STRUC-REPT-376] N80-33798
A compilation of computer software programs available in the Flight Dynamics Laboratory, 1979
[AD-A088654] N80-34156
Multiple Microprocessor System (MMS) design study, volume 2
[AD-A088066] N80-34160
The probability of survival of redundant systems under a static load N80-34199
DESULFURIZING
Air Pollution control device configurations
[PB80-193253] N80-33972
DETERMINANTS
Topics in analysis
[AD-A080463] N80-34189
DETONATION WAVES
Unconfined hydrocarbon air mixture explosion studies performed in France by CEA-EDF-GDF and the University N80-33585
Evaluation of the effects of detonation in a spherical bomb N80-33594
DEW
Determination of atmospheric water vapor from dewpoint measurement
[PB80-197189] N80-34039
DIELECTRICS
On the microwave interaction with matter and microwave breakdown of air
[AD-A088936] N80-33656
DIESEL ENGINES
Potential of diesel engine, diesel engine design concepts, control strategy and implementation
[PB80-195746] N80-33752
The behavior of the military battery type BB248/U used to start the engine of the A.P.C.
[AD-A080615] N80-33905
The assessment of smoke emission from diesel-engined vehicles N80-33935
DIESEL FUELS
Preparation and stability of emulsions of methanol in automobile diesel oil
[CSIR-CENG-294] N80-33579
DIFFERENCE EQUATIONS
Steady state spurious errors in shock-capturing numerical schemes
[KTH-AERO-TN-60] N80-33353
DIFFERENTIAL EQUATIONS
Numerical study of baroclinic instability
[NASA-CR-161580] N80-33662
Mathematical simulation of the transport of oxygen and important metabolites in the human brain N80-34092
On the asymptotic analysis of Griffiths' period mapping N80-34174
Ordinary differential equations
[INPE-1753-RPE/144] N80-34184
The use of computers in solving mathematical problems. Citations from the NTIS data base
[PB80-813298] N80-34194
DIFFERENTIAL PRESSURE
Automated calibrations and dynamic corrections for differential pressure transmitters
[AGNS-35900-CONF-65] N80-33730
DIFFERENTIAL THERMAL ANALYSIS
On the application of nonlinear load elements to thermal analyses using the NASTRAN thermal analyzer N80-33789
DIFFRACTION
On the application of the GTD-MM technique and its limitations
[AD-A088806] N80-33655
DIFFRACTION PROPAGATION
The stress-wave radiation from growing cracks
[ARL/MAT-REPT-112] N80-33796
DIFFUSION
The diffusion of copper into gold coatings at elevated temperatures
[BLL-RTS-12292] N80-33535
Diffusion approximations for the analysis of digital phase locked loops
[AD-A088703] N80-33689
Diffusion controlled current at a stationary finite disk electrode. Experiment
[AD-A089063] N80-33693
Analytical and numerical solutions for mass diffusion in a composite cylindrical body N80-33698
DIGITAL COMPUTERS
Digital computers as components of complex systems
[DFVLR-MITT-79-02] N80-34113
DIGITAL DATA
Tropospheric scatter communications. Citations from the NTIS data base
[PB80-812571] N80-33386
DCT/DPCM processing of NTSC composite videosignal N80-33635
Able image chain analysis. Revision
[AD-A088853] N80-33651
A quantitative evaluation of LANDSAT for monitoring suspended sediments in a fluvial channel N80-33823
DIGITAL FILTERS
Digital filtering of LANDSAT images as a visual aid technique in geological photointerpretation
[INPE-1823-RPE/189] N80-33843
DIGITAL NAVIGATION
Inertial navigation and guidance. Citations from the NTIS data base
[PB80-812415] N80-33389
DIGITAL SIMULATION
Pilot/vehicle model analysis of visual and motion cue requirements in flight simulation — helicopter hovering
[NASA-CR-3312] N80-33398
MOD-2 wind turbine farm stability study
[NASA-CR-165156] N80-33862
DIGITAL SYSTEMS
Digital Avionics Information System (DAIS): Life cycle cost impact modeling system Reliability, Maintainability, and Cost Model (RMCM): User's guide
[AD-A089045] N80-33405
Methods of digital speech signal transmission
[BLL-RDL-TRANS-3798-(7737.470)] N80-33622

The TRANSMIC system. 1: General principles and presentation
[BLL-RDL-TRANS-3786-(7737.470)] N80-33623
The TRANSMIC system. 3: Operations, availability and quality of service
[BLL-RDL-TRANS-3785-(7737.470)] N80-33624
The 1979 towed source experiment signal generator
[AD-A086757] N80-33859
Diffusion approximations for the analysis of digital phase locked loops
[AD-A088703] N80-33869
Interactive digital image processing investigation, phase 2
[AD-A087518] N80-33948
Building block modeling methodology for composition of microprocessor-based digital systems N80-34109
MAPS image compression
[AD-A086763] N80-34153

DIGITAL TECHNIQUES
Digital flight control research using microprocessor technology
[AD-A089147] N80-33417
Alternatives for the development of future television systems
[BLL-RTS-12332] N80-33626
A method for edge detection in images of natural resources
[INPE-1788-RPE/154] N80-33840
Digital image processing of conventional transmission electron micrographs N80-34229
An application of digital image techniques to the high-velocity material in NGC 1275 N80-34304

DILATOMETRY
Sorption, transport and dilatometric studies in glassy polymers N80-33569

DIODES
Atmospheric solar absorption measurements in the 9 to 11 mu m region using a diode laser heterodyne spectrometer
[NASA-TP-1726] N80-33898

DIOPHANTINE EQUATION
The size of numbers in the analysis of certain algorithms N80-34142

DIPOLE ANTENNAS
IMP 8. Volume 1: EM field experiment
[NASA-CR-160023] N80-33450

DIRECTIONAL ANTENNAS
TRISCAN: A method of precision antenna positioning N80-33444

DIRECTIONAL CONTROL
Cavitation damage mechanisms: Experimental study cavitation in a spool valve — components of aircraft hydraulic systems
[AD-A089653] N80-33750

DIRECTIONAL SOLIDIFICATION (CRYSTALS)
Directional solidification of nonoxide eutectics
[AD-A088565] N80-33557

DIRECTIVITY
Astronomical telescope for photons-gamma rays of low energy (approximately 4 MeV using the difference method like a Venetian blind
[INPE-1907-RPE/175] N80-34306

DISCRETE FUNCTIONS
The application of generalized group inverse to discrete finite Markov chains N80-34195

DISPERSING
A sensitivity analysis of volcanic aerosol dispersion in the stratosphere — Mt. Fuego, Guatemala eruptions
[NASA-CR-163606] N80-33926

DISPLAY DEVICES
Development of an electrophoretic image display
[AD-A089121] N80-33729

DISSIPATION
Conservation laws with dissipation
[AD-A086762] N80-34276

DISTANCE MEASURING EQUIPMENT
Precision I-band DME tests
[AD-A089053] N80-33086

DISTRIBUTION FUNCTIONS
N-body simulations of stellar systems containing massive black holes N80-34309

DIURNAL VARIATIONS
Geomagnetic activity and the equatorial scintillation of satellite signals
[AD-A088948] N80-33852
Investigations of medium wavelength magnetic anomalies in the eastern Pacific using Magsat data
[E80-10334] N80-33833
In-flight characteristics of the topside ionospheric monitor (SSIE) on the DMSP satellite flight 2 and flight 4
[AD-A088879] N80-34005

DIVING (UNDERWATER)
The use of computer-controlled manipulators in underwater technology
[DFVLR-MITT-79-02] N80-34117

DOMAINS
A simple method for converting frequency domain aerodynamics to the time domain
[NASA-TM-81844] N80-33358

DOMESTIC ENERGY
Energy policy: Supply and demand alternatives
[GPO-56-541] N80-33870

DOMINANCE
The role of functional asymmetry of the central nervous system in pilot performance N80-34269

DOPED CRYSTALS
Studies of indium-doped silicon — infrared detector development
[AD-A088736] N80-34269

DOPES
In situ doping of thin Ca (x)Hg (1-x)Te films obtained by cathode sputtering in mercury vapour. Application to the production of infrared detectors
[BLL-RTS-11980] N80-33528

DOPPLER EFFECT
Data collection platforms: A technique for space telemetry applied to surveying ambient parameters
[INPE-1743-RPE/139] N80-33459
Radio spectral characteristics of extragalactic objects N80-34333

DOPPLER RADAR
Wind shear detection with pulse Doppler radar
[AD-A088576] N80-34032

DOWNLINKING
CPSK, DPSK, and FSK demodulator performance under nuclear stressed conditions
[AD-A088364] N80-33665

DRAG MEASUREMENT
Afterbody drag. Volume 3: Literature survey — bibliographies
[AD-A088938] N80-33361
Determination and maintenance of Earth orbits with arcs of minimum altitude variation N80-33447

DRAG REDUCTION
Drag-free estimation feasibility study
[NASA-CR-163635] N80-33454

DRAINAGE PATTERNS
A watershed information system N80-33825

DRILLING
Analysis of in-line flow-induced vibrations using linearization methods N80-33710

DROP SIZE
Techniques for examining drop size spectra in water sprays and clouds
[ARL/MECH-ENG-NOTE-375] N80-33721
A study of the microstructure of convective clouds: Observation and theory N80-34019

DROPS (LIQUIDS)
Droplet evaporation in high temperature environments N80-33696
The extended Rayleigh theory of the oscillation of liquid droplets
[AD-A088894] N80-33724

DROUGHT
Statistical relation between the solar cycle and drought in northeast Brazil
[INPE-1839-RPE/200] N80-34024
Workshop for Forecasting Droughts in Northeast Brazil
[INPE-1739-RPE/138] N80-34027

DRUMS (CONTAINERS)
Investigations into the distribution of the layer thickness produced by barrel electroplating in the case of cyanic silver plating
[BLL-RTS-12204] N80-33536

DUCTED BODIES
Study for conceptual design of VEO, VTOL exhaust nozzle
[NASA-CR-152388] N80-33397

DUCTED FANS
High bypass turbofan component development. Amendment 1: Small fan redesign
[AD-A089067] N80-33413

DUCTILITY
Fracture and flow of iron and its alloys: Theory and experiment N80-33554

DUCTS
Study of laminar and turbulent flow in ducts of polar cross-section N80-33699

DURABILITY
Improved bond coatings for use with thermal barrier coatings
[NASA-TM-81567] N80-33556

DUST COLLECTORS
Collecting fly ash from low sulphur coals: An Overview of Australian experience N80-33932
The prevention of dust emissions in South Africa by electrostatic precipitation N80-33937
A method for routine isokinetic dust sampling N80-33942

DUST STORMS
Climatological relationships of severe dustatorms in the Great Plains to synoptic weather patterns: A potential for predictability
[NASA-CR-163626] N80-34022

DYNAMIC CHARACTERISTICS
NASA plan for international crustal dynamics studies
[NASA-TM-82214] N80-34000

DYNAMIC CONTROL
Across three (active control of space structures), phase 1
[AD-A089142] N80-33461

DYNAMIC MODELS
Dynamic fractures in orthotropic fiber composites N80-33486
N-body simulations of stellar systems containing massive black holes N80-34309

DYNAMIC RESPONSE
Application of identical aerodynamic functions N80-33372
Aircraft crash survival design guide. Volume 3: Aircraft structural crashworthiness
[AD-A089104] N80-33385
Investigation of vibration reduction through structural optimization
[AD-A088917] N80-33403
Plenum response to simulated disturbances of the model and fan inlet guide vanes in a transonic tunnel
[NASA-TM-81869] N80-33418
Nonstationary random response of structural systems to aerodynamic wind forces N80-33775
Solution sensitivity and accuracy study of NASTRAN for large dynamic problems involving structural damping N80-33785
Ring element dynamic stresses N80-33786
Local response of ITO/polysilicon solar cells N80-33955
Characterization of three types of silicon solar cells for SEPS Deep Space Mission. Volume 3: Current-voltage characteristics of spectrolab sculptured BSR/P+ (K7), BSR/P+ (K6.5) and BSR (K4.5) cells as a function of temperature and intensity
[NASA-TM-78305] N80-33863

DYNAMIC STABILITY
MOD-2 wind turbine farm stability study
[NASA-CR-165156] N80-33862

DYNAMIC STRUCTURAL ANALYSIS
The dynamics and control of large flexible space structures. Volume 3, part B: The modelling, dynamics, and stability of large Earth pointing orbiting structures
[NASA-CR-163612] N80-33449
Design for the prevention of progressive collapse using interactive computer graphics N80-33767
General nonlinear computer analysis of framed structures N80-33769

DYNAMIC TESTS
Helicopter flight test instrumentation
[AGARD-AG-160-VOL-10] N80-33406
Introduction to the fundamentals of strain gauge practice
[NAST-79/154] N80-33728

E

EARTH ALBEDO
Absorption equilibrium of solar radiation between the two hemispheres of Earth
[INPE-1851-RPE/208] N80-33995

EARTH ATMOSPHERE
Potential use of terrestrial photovoltaics for future space solar arrays N80-33982
The perturbation of some atmospheric mechanisms by emissions from aircraft
[AD-A089100] N80-33985
Proceedings of the NATO Advanced Study Institute on Atmospheric Ozone and its variation and human influences
[AD-A088889] N80-34006
EARTH CRUST
Investigations of medium wavelength magnetic anomalies in the eastern Pacific using Magsat data
[E80-10334] N80-33833
Comparative petrology of the Apollo 11 mare basalt, part 1. The oxygen isotope geochemistry of the Abitibi greenstone belt, part 2 N80-34313
EARTH MANTLE
Investigations of medium wavelength magnetic anomalies in the eastern Pacific using Magsat data
[E80-10334] N80-33833
EARTH MOVEMENTS
Fundamentals studies in geodynamics
[NASA-CR-163620] N80-33993
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research
[NASA-TM-82215] N80-33999
NASA plan for international crustal dynamics studies
[NASA-TM-82214] N80-34000
EARTH OBSERVATIONS (FROM SPACE)
Private sector involvement in civil space remote sensing. Volume 1: Report
[NASA-TM-82206] N80-33845
Private sector involvement in civil space remote sensing. Volume 2: Appendices
[NASA-TM-82207] N80-33846
EARTH RESOURCES INFORMATION SYSTEM
Operational remote sensing legislation, part 1
[GPO-45-048] N80-34294
Operational remote sensing legislation, part 2
[GPO-52-581] N80-34295
EARTH-MOON SYSTEM
Two problems pertaining to the dynamics of the origin of the Moon, and its subsequent orbital evolution N80-34310
EARTHQUAKES
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research
[NASA-TM-82215] N80-33999
ECCENTRIC ORBITS
A comparison of solar array radiation damage models N80-33891
ECONOMIC ANALYSIS
Optimum systems design with random input and output applied to solar water heating N80-33854
ECONOMIC FACTORS
The status of environmental economics: An update
[GPO-48-402] N80-33963
EDDY VISCOSITY
Turbulent heat transfer to liquid metals in a circular pipe N80-33705
EFFECTIVE PERCEIVED NOISE LEVELS
A case study of environmental noise evaluation
[NPL-AR-96] N80-33925
EFFERENT NERVOUS SYSTEMS
The role of functional asymmetry of the central nervous system in pilot performance N80-34069
Distinctions of pilot motor activity in different piloting modes during landing approaches N80-34070
EFFICIENCY
A numerical study of the efficiency with which aerosol particles collide with simple planar ice crystals N80-33985
EFFLUENTS
Current techniques for the elimination of airborne mists and soluble solids N80-33940
EGYPT
Explosion hazards in the Suez Canal: An overview N80-33584
EIGENVALUES
Applications of non-self-adjoint operator theory to the Singularity Expansion Method (SEM) and the Eigenmode Expansion Method (EEM) in acoustic and electromagnetic problems
[AD-A088747] N80-34191
The stability of planar dynamical systems linear-in-cones
[CSIR-TWISK-137] N80-34212
EIGENVECTORS
Steady state spurious errors in shock-capturing numerical schemes
[KTH-AERO-TN-60] N80-33353
ELASTIC BODIES
The stress-wave radiation from growing cracks
[ARL/MAT-REPT-112] N80-33796
The equilibrium field near the tip of a crack for finite plane strain of incompressible elastic materials
[AD-A088838] N80-33800
ELASTIC PLATES
Elastic plate vibrations by boundary integral equations. Part 1: Infinite phase
[AD-A089105] N80-33806
ELASTIC PROPERTIES
Numerical analysis of equilibrium problems in incompressible nonlinear elasticity N80-33763
Finite element analysis for elasto visco-plastic materials N80-33770
Finite circular plate on elastic foundation centrally loaded by rigid spherical indenter N80-33792
On the dynamic energy release rate in elastic crack propagation
[AD-A089119] N80-33802
On Irwins and Achenbachs expressions for the energy release rate
[AD-A089118] N80-33803
ELASTIC SCATTERING
High-energy proton-proton elastic scattering N80-34236
ELASTIC WAVES
Elastic waves hexagonal honeycomb N80-33834
ELASTODYNAMICS
A numerical boundary integral equation method for transient motions N80-34168
ELASTOPLASTICITY
Elastic-plastic analysis using a triangular ring element in NASTRAN N80-33793
ELECTRIC BATTERIES
Toroidal cell and battery — energy storage for orbital space applications or power cells for electric vehicles
[NASA-CASE-LEW-12918-1] N80-33857
The behavior of the military battery type BB248/U used to start the engine of the A.P.C.
[AD-A080615] N80-33905
Evaluation of cranking characteristics of commercially available batteries between room temperature and -40 C
[AD-A080614] N80-33906
Battery electrolytes. Citations from the NTIS data base
[PB80-808629] N80-33915
Battery electrolytes. Citations from the Engineering Index data base
[PB80-808637] N80-33916
ELECTRIC CONNECTORS
Hard-gold coatings deposited using pulsating current and their suitability for use in plug connections
[BLL-RTS-12203] N80-33524
Noble metal electroplated coatings on printed circuit connectors — gold coatings
[BLL-RTS-12265] N80-33537
The danger of intermodulation generation by RF connector hardware containing ferromagnetic materials
[AD-A088788] N80-33657
Connector design techniques to avoid RFI
[AD-A088789] N80-33686
ELECTRIC CURRENT
Power losses in liquid metal current collectors
[AD-A086527] N80-33684
Diffusion controlled current at a stationary finite disk electrode. Experiment
[AD-A089063] N80-33693
ELECTRIC DIPOLES
IMP 8. Volume 1: EM field experiment
[NASA-CR-160023] N80-33450
ELECTRIC EQUIPMENT
Experimental and analytical studies for the NASA carbon fiber risk assessment
[NASA-CR-159214] N80-33490
ELECTRIC FIELDS
Two tests of electric fields, second-order in source-velocity terms of closed steady currents. 1: An electron beam. 2: A superconducting coil N80-33674
ELECTRIC GENERATORS
Oversight: Wind energy program
[GPO-51-382] N80-33872
Fluidized-bed combustion for pollution control N80-33936
ELECTRIC MOTOR VEHICLES
Toroidal cell and battery — energy storage for orbital space applications or power cells for electric vehicles
[NASA-CASE-LEW-12918-1] N80-33857
Lead batteries. Citations from the NTIS data base
[PB80-813363] N80-33923
Lead batteries. Citations from the Engineering Index data base
[PB80-813371] N80-33924
Verification test of the change-of-pace station wagon
[AD-A089059] N80-34297
Verification test of the battronic mini van
[AD-A089058] N80-34298
ELECTRIC NETWORKS
Synthesis methods applicable to SEM pole pair admittances
[AD-A088923] N80-33890
ELECTRIC POWER PLANTS
Air Pollution control device configurations
[PB80-193253] N80-33972
Assessment of H2S control technologies for geothermal power plants
[PB80-193709] N80-33973
ELECTRIC PROPULSION
NASA technology program overview N80-33467
Air Force space power technology program N80-33468
ELECTRIC WELDING
Ultrathin cell module technology — silicon N80-33878
ELECTRICAL ENGINEERING
MOD-2 wind turbine farm stability study
[NASA-CR-165158] N80-33862
ELECTRICAL IMPEDANCE
Synthesis methods applicable to SEM pole pair admittances
[AD-A088923] N80-33890
Local response of ITO/polysilicon solar cells N80-33855
ELECTRICAL INSULATION
Cathodic corrosion-protection in areas subject to explosion hazards
[BLL-T4934/BG/ERS/79(9022.04B)] N80-33542
ELECTRICAL PROPERTIES
Evaluation and prediction of long term space environmental effects on non-metallic materials
[NASA-CR-161585] N80-33479
Electrochemically deposited cadmium telluride films and their application to solar cells N80-33853
ELECTRICAL RESISTIVITY
The design and implementation of a computerized data reduction system
[AD-A088734] N80-34007
Steady state treatment of relativistic electron beam erosion
[AD-A089047] N80-34237
ELECTRO-OPTICS
Single chip lenses for ultrasonic imaging
[AD-A088857] N80-34220
Advanced electro-optical tracker/ranger
[AD-A089143] N80-34254
Research in general physics, plasma dynamics, and communication sciences and engineering
[RLE-PR-122] N80-34338
ELECTROCARDIOGRAPHY
New engineering approaches to noninvasive His-Purkinje system recordings N80-34087
ELECTROCHEMICAL CORROSION
Chromating
[BLL-RTS-12344] N80-33540
ELECTROCHEMICAL MACHINING
The mechanical pretreatment of printed circuit boards
[BLL-RTS-12263] N80-33671
ELECTROCHEMISTRY
Electrochemical Orbital Energy Storage (ECOES) technology program — regenerative fuel cell system N80-33473
Electrochemically deposited cadmium telluride films and their application to solar cells N80-33853
Fixation of Zn(ii) ions on metal oxide surfaces
[BLL-RTS-12200] N80-34262

ELECTROCONDUCTIVITY
Local response of ITO/polysilicon solar cells N80-33655
ELECTRODEPOSITION
Hard-gold coatings deposited using pulsating current and their suitability for use in plug connections [BLL-RTS-12203] N80-33524
The use of gluconates for electrolytic and current-less metal depositing [BLL-RTS-11997] N80-33530
ELECTRODES
Status of nickel-hydrogen cell technology N80-33474
Diffusion controlled current at a stationary finite disk electrode. Experiment [AD-A089063] N80-33660
Toroidal cell and battery — energy storage for orbital space applications or power cells for electric vehicles [NASA-CASE-LEW-12918-1] N80-33857
ELECTRODYNAMICS
Investigation of electrodynamic stabilization and control of long orbiting tethers [NASA-CR-161584] N80-33748
ELECTROLESS DEPOSITION
The use of gluconates for electrolytic and current-less metal depositing [BLL-RTS-11997] N80-33530
Chemical nickel-plating with sodium borohydride. Process technology and properties of coats [BLL-RTS-12156] N80-33532
ELECTROLYSIS
An investigation of the electrochemical behavior of graphite fiber-polymer composites N80-33485
Electroplating: Metal deposits by electrolysis, throwing power [BLL-RTS-11870] N80-33527
ELECTROLYTES
Trace analysis of antimony by differential pulse anodic stripping voltammetry N80-33507
Characterization and theory of electrolyte-insulator-semiconductor field-effect transistor N80-33678
Battery electrolytes. Citations from the NTIS data base [PB80-808629] N80-33915
Battery electrolytes. Citations from the Engineering Index data base [PB80-808637] N80-33916
ELECTROLYTIC CELLS
Toroidal cell and battery — energy storage for orbital space applications or power cells for electric vehicles [NASA-CASE-LEW-12918-1] N80-33857
ELECTROLYTIC POLARIZATION
The interaction between pipe-coatings and cathodic corrosion-protection [BLL-TRANS-T4943/BG/ERS/79] N80-33541
ELECTROMAGNETIC FIELDS
Control of the recombination time in photoconductive detectors [INPE-1814-RPE/182] N80-33681
Quantum field-theoretical electromagnetic and gravitational two-particle potentials N80-34275
ELECTROMAGNETIC INTERACTIONS
Interaction of electrons and electromagnetic waves in periodic structures [AD-A088739] N80-33662
Three wave nonlinear interactions in dispersive media N80-34245
Some aspects of the nonlinear interaction of light and matter N80-34248
ELECTROMAGNETIC RADIATION
Interaction of electrons and electromagnetic waves in periodic structures [AD-A088739] N80-33662
On the comet model of Biermann et al [INPE-1805-RPE/173] N80-34323
ELECTROMAGNETIC SCATTERING
Applications of non-self-adjoint operator theory to the Singularity Expansion Method (SEM) and the Eigenmode Expansion Method (EEM) in acoustic and electromagnetic problems [AD-A088747] N80-34191
ELECTROMAGNETIC WAVE FILTERS
Spatial pulse compression [AD-A084750] N80-33663
ELECTROMAGNETIC WAVE TRANSMISSION
Cosmic ray propagation and instabilities N80-34334
ELECTROMAGNETISM
Precise predictions of grand unified gauge theories N80-33627
ELECTROMYOGRAPHY
Distinctions of pilot motor activity in different piloting modes during landing approaches N80-34070
ELECTRON BEAMS
Baffle aperture design study of hollow cathode equipped ion thrusters [NASA-CR-165184] N80-33476
Research on low temperature, directed energy processing of very large scale integrated structures [AD-A088982] N80-33621
Two tests of electric fields, second-order in source-velocity terms of closed steady currents. 1: An electron beam. 2: A superconducting coil N80-33674
Research study on near millimeter wave orotrons [AD-A089097] N80-33682
Stimulated emission processes from free electrons N80-33732
Experimental electron-impact excitation and ionization of positive ions N80-34226
ELECTRON BOMBARDMENT
Collective acceleration of ions in vacuum N80-34230
ELECTRON DENSITY (CONCENTRATION)
Equatorial spread F in situ measurements of electron density temperature and density fluctuation power spectra [AD-A089133] N80-34008
ELECTRON DENSITY PROFILES
Comment on Airglow observations of the OI 7774 A multiplet at Arecibo during a magnetic storm by Roger G. Burnside, John W. Meriwether and James C. G. Walker [INPE-1943-RPE/203] N80-33694
ELECTRON DIFFUSION
Baffle aperture design study of hollow cathode equipped ion thrusters [NASA-CR-165184] N80-33476
ELECTRON GUNS
Interaction of electrons and electromagnetic waves in periodic structures [AD-A088739] N80-33662
Vector-potential flow in relativistic beam diodes [AD-A089135] N80-33694
ELECTRON IMPACT
Experimental electron-impact excitation and ionization of positive ions N80-34226
ELECTRON IRRADIATION
Comparison of silicon solar cell characteristics at operating temperature after electron irradiation N80-33690
ELECTRON MICROSCOPES
Development of a scanning electron microscope based microanalytical system N80-33512
Digital image processing in ion microscope analysis: Methods of image quantification [AD-A088792] N80-33559
In situ experiments in the 1 MV electron microscope. Part 1: Feasibility and methodology N80-33618
ELECTRON MICROSCOPY
Digital image processing of conventional transmission electron micrographs N80-34228
ELECTRON ORBITALS
Localized atomic orbitals for atoms in molecules N80-34225
ELECTRON PARAMAGNETIC RESONANCE
Optical and magnetic resonance studies of energy transfer in inorganic molecular solids [AD-A088567] N80-34271
ELECTRON PRECIPITATION
Relativistic electron precipitation: An observational study N80-33827
ELECTRON RADIATION
Stimulated emission processes from free electrons N80-33732
ELECTRON SCATTERING
Total and differential scattering cross section measurements for positrons and electrons colliding with inert gases N80-34227
ELECTRONIC EQUIPMENT
Carbon/graphite fiber risk analysis and assessment study: Assessment of risk to the Lockheed Model L-1011 commercial transport aircraft [NASA-CR-159201] N80-33487
Carbon/graphite fiber risk analysis and assessment study: An assessment of the risk to Douglas commercial transport aircraft [NASA-CR-159212] N80-33488
Electronic equipment vulnerability to fire released carbon fibers [NASA-TM-80219] N80-33491
ELECTRONS
Interaction of electrons and electromagnetic waves in periodic structures [AD-A088739] N80-33662
ELECTROPHORESIS
Development of an electrophoretic image display [AD-A089121] N80-33729
ELECTROPHYSIOLOGY
New engineering approaches to noninvasive His-Purkinje system recordings N80-34087
ELECTROPLATING
Selective electroplating processes [BLL-RTS-11980] N80-33506
Electroplating: Metal deposits by electrolysis, throwing power [BLL-RTS-11870] N80-33527
The deposition of palladium coatings with low hydrogen content and stress in sulphuric acid electrolyte [BLL-RTS-12267] N80-33534
Resistance to corrosion of chromated zinc coatings [BLL-RTS-12304] N80-33536
Noble metal electroplated coatings on printed circuit connectors — gold coatings [BLL-RTS-12265] N80-33537
Investigations into the distribution of the layer thickness produced by barrel electroplating in the case of cyanic silver plating [BLL-RTS-12204] N80-33538
Chromating [BLL-RTS-12344] N80-33540
ELECTROSTATIC DRAG
Drag-free estimation feasibility study [NASA-CR-163635] N80-33454
ELECTROSTATIC PRECIPITATORS
The prevention of dust emissions in South Africa by electrostatic precipitation N80-33937
Progress with a new velocity electric precipitator the Electro-Dynamic Venturo (EDV) N80-33941
International Conference on Air pollution, volume 4 N80-33954
Operating experiences with improved rapping on electrostatic precipitators treating fly ash from high and low sulphur coals N80-33956
Electrostatic precipitation research in Japan [PB80-194137] N80-33975
ELECTROSTATIC PROBES
Ion-ion neutralization [AD-A080209] N80-34001
ELECTROSTATICS
Large electrostatic potential variations in laboratory plasmas N80-34260
ELEMENTARY PARTICLE INTERACTIONS
Inclusive study of 200 GeV/c pi-neon interactions N80-34232
ELLIPTIC FUNCTIONS
Improved algorithm for calculation of UTM and geodetic coordinates — Jacobi elliptic functions [NOAA-S/T-80-281] N80-33836
EMBRITTLEMENT
HVEM studies of helium embrittlement in stainless steel N80-33547
EMISSION
Developments in industrial emission measurements: Progress towards an automated isokinetic sampler N80-33945
Aspects of the interaction among some of the parameters of importance to pollution potential considerations N80-33949
EMISSION SPECTRA
Extreme ultra-violet emission from coronal structures [AD-A087803] N80-34329
EMISSIVITY
Development of a soil moisture model for use with passive microwave remote sensors N80-33828
EMULSIONS
Preparation and stability of emulsions of methanol in automobile diesel oil [CSIR-CENG-294] N80-33579

ENERGY ABSORPTION FILMS
Development of a site-fabricated, building integrated air solar system
[ALO-4123-5] N80-33913
ENERGY BUDGETS
Defining relationships between surface characteristics and actual evaporation rate
[E80-10335] N80-33834
ENERGY CONSERVATION
Energy conservation and management study of aircraft hangars at selected Air Force Bases
[AD-A089075] N80-33420
Energy policy: Supply and demand alternatives
[GPO-56-541] N80-33870
Incentives for energy conservation
[GPO-55-634] N80-33871
Working group on fuel consumption targets
[NP-24333] N80-33910
Conservation and solar energy programs of the Department of Energy: A critique
[PB80-197759] N80-33922
Energy: Careful conservation or regulated waste — control of automobile exhaust emissions N80-33951
ENERGY CONSUMPTION
Deep space network energy program N80-33446
ENERGY CONVERSION
NASA technology program overview N80-33467
Air Force space power technology program N80-33468
Optimum systems design with random input and output applied to solar water heating N80-33854
Cogeneration Technology Alternatives Study (CTAS). Volume 4: Energy conversion systems
[NASA-CR-159768] N80-33859
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 1: Coal-fired nocogeneration process boiler, section A
[NASA-CR-159770-PT-1] N80-33860
Energy programs at the John Hopkins University Applied Physics Laboratory
[PB80-195316] N80-33919
Energy conservation-air pollution abatement project N80-33939
ENERGY CONVERSION EFFICIENCY
Photovoltaic technology development for synchronous orbit N80-33470
Evaluation of processes for producing gasoline from wood
[DOE/PE-70048/T2] N80-33602
Aspects of large area and thin silicon solar cell technologies N80-33884
Thin, high efficiency silicon solar cells — 56 micrometers thick N80-33885
Qualification test results of the production high efficiency K6-3/4 and K7 silicon solar cells N80-33886
Development of space-qualified GaAs solar cells N80-33888
Comparison of silicon solar cell characteristics at operating temperature after electron irradiation N80-33890
ENERGY DISSIPATION
Power losses in liquid metal current collectors
[AD-A086527] N80-33684
ENERGY LEVELS
Energy transfer in ionic and molecular systems N80-34222
ENERGY POLICY
Development and application of analytical techniques to chemistry of donor solvent liquefaction
[DOE/PC-20041/T1] N80-33520
Oversight: Alternate liquid fuels technology
[GPO-50-313] N80-33580
Oversight: Cost estimation techniques for emerging synthetic fuels technology, volume 9
[GPO-51-721] N80-33581
Solar heating system at Quitman County Bank, Marks, Mississippi
[NASA-CR-161549] N80-33858
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 1: Coal-fired nocogeneration process boiler, section A
[NASA-CR-159770-PT-1] N80-33860
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 2: Residual-fired nocogeneration process boiler
[NASA-CR-159770-PT-2] N80-33861
Installation, operation, and maintenance for the pyramidal optics solar system installed at Yacht Cover, Columbia, South Carolina
[NASA-CR-161203] N80-33864
Energy policy: Supply and demand alternatives
[GPO-56-541] N80-33870
Oversight: Wind energy program
[GPO-51-382] N80-33872
Photovoltaic generators in space — conference proceedings, Heidelberg, 15-17 Apr. 1980
[ESA-SP-147] N80-33873
Impact of terrestrial solar cell development on space applications N80-33893
Satellite power systems: Status and planned activities N80-33904
The potential of energy farming in the southeastern California desert
[PB80-195019] N80-33921
Conservation and solar energy programs of the Department of Energy: A critique
[PB80-197759] N80-33922
Environment: The energy connection N80-33955
Pulsed power accelerators for particle beam fusion
[SAND-80-0560C] N80-34239
ENERGY REQUIREMENTS
Deep space network energy program N80-33446
Oversight: Cost estimation techniques for emerging synthetic fuels technology, volume 9
[GPO-51-721] N80-33581
ENERGY SOURCES
NASA technology program overview N80-33467
Municipal refuse as a fuel for power generation N80-33950
Utilization of municipal refuse as an energy source N80-33952
ENERGY STORAGE
Electrochemical Orbital Energy Storage (ECOES) technology program — regenerative fuel cell system N80-33473
Power management N80-33475
Low-cost flywheel demonstration program
[CONS-5085-T2] N80-33909
ENERGY TECHNOLOGY
Synchronous energy technology program N80-33466
Hydrogen use as a fuel. Citations from the NTIS data base
[PB80-813090] N80-33807
Solar heating system at Quitman County Bank, Marks, Mississippi
[NASA-CR-161549] N80-33858
State-of-the-art reviews and bibliographies on energy. Citations from the NTIS data base
[PB80-812886] N80-33917
State-of-the-art reviews and bibliographies on energy. Citations from the NTIS data base
[PB80-812894] N80-33918
Energy programs at the John Hopkins University Applied Physics Laboratory
[PB80-195316] N80-33919
International Conference on Air Pollution, volume 3
[ISBN-0-7988-1665-1] N80-33943
The use of solar energy for cooking N80-33953
Technology Assessment. Citations from the NTIS data base
[PB80-813165] N80-34289
Technology Assessment. Citations from the NTIS data base
[PB80-813173] N80-34300
ENERGY TRANSFER
The pressurized fluidized bed gasification of coal char
[BLL-RTS-12347] N80-33575
Determining the form factors of plane and cylindrical surfaces by numerical methods
[INPE-1815-RPE/183] N80-34185
Energy transfer in ionic and molecular systems N80-34222
High temperature gas energy transfer
[AD-A089129] N80-34235
Optical and magnetic resonance studies of energy transfer in inorganic molecular solids
[AD-A088567] N80-34271
ENGINE CONTROL
Potential of diesel engine, diesel engine design concepts, control strategy and implementation
[PB80-195746] N80-33752
ENGINE DESIGN
Conceptual model of turbulent flameholding for scramjet combustors
[NASA-TP-1543] N80-33409
Potential of diesel engine, diesel engine design concepts, control strategy and implementation
[PB80-195746] N80-33752
ENGINE NOISE
Aircraft noise prediction program validation
[NASA-CR-159333] N80-34219
ENGINE PARTS
Energy efficient engine
[NASA-CR-159685] N80-33408
ENGINE STARTERS
The behavior of the military battery type BB348/U used to start the engine of the A.P.C.
[AD-A080615] N80-33905
ENVIRONMENT EFFECTS
Cleaning agents and techniques for concentrating solar collectors
[SAND-79-7052] N80-33911
Preliminary study of the potential environmental concerns associated with surface waters and geothermal development of the Valles Calders
[LA-8368-MS] N80-33969
Assessment of alternative strategies for sludge disposal into deep ocean basins off southern California
[PB80-192990] N80-33971
Proceedings of the Workshop on Government Oil Spill Modeling
[NASA-CR-163640] N80-33979
ENVIRONMENT PROTECTION
International Conference on Air Pollution, volume 1
[ISBN-0-7988-1665-1] N80-33929
A philosophy for clean air N80-33930
Environment: The energy connection N80-33955
Environmental air quality control from the inside looking out N80-33960
The status of environmental economics: An update
[GPO-48-402] N80-33963
Engineering reference manual for coding NEDS (National Emissions Data System) and EIS/P and R (Emission Inventory Subsystem/Permits and Registration) forms
[PB80-194665] N80-34289
ENVIRONMENT SIMULATION
Carbonate formation on Mars — environment simulation N80-34314
ENVIRONMENTAL LABORATORIES
Efficient thermal cycling of solar panels in solar simulation facilities with a multi-panel test rig N80-33898
ENVIRONMENTAL QUALITY
The status of environmental economics: An update
[GPO-48-402] N80-33963
Aircraft noise prediction program validation
[NASA-CR-159333] N80-34219
ENVIRONMENTAL TESTS
Qualification test results of the production high efficiency K6-3/4 and K7 silicon solar cells N80-33886
Performance of the solar cell experiment on the NTS-2 satellite — navigation technology satellite N80-33895
ENZYME ACTIVITY
Template activity of chromatin DNA and the adenylate cyclase system of rat tissues following flight aboard the Cosmos-936 biosatellite N80-34067
EPITAXY
Two approaches towards a low power solid state laser N80-33734
The epitaxial polymerization of (SN)x N80-34264
EPITHELIUM
Lesions to and recovery of mouse seminiferous epithelium after exposure to radiation at different dose rates N80-34079
EPOXY COMPOUNDS
Catalytic incineration of graphite fibers in a graphite-epoxy composite fire
[AD-A088897] N80-33503
EPOXY RESINS
Influence of quality control variables on failure of graphite/epoxy under extreme moisture conditions
[NASA-TM-81246] N80-33493

EQUATIONS OF MOTION
Longitudinal stability and control in wind shear with energy height rate feedback
[NASA-TM-81839] N80-33416
Determination and maintenance of Earth orbits with zero of minimum altitude variation N80-33447
The dynamics and control of large flexible space structures. Volume 3, part B: The modeling, dynamics, and stability of large Earth pointing orbiting structures
[NASA-CR-163812] N80-33449
Mountain waves and momentum flux N80-33815

EQUATORIAL ATMOSPHERE
Orographically controlled cross-equatorial flow N80-33821
Instrumentation development for LASSI equatorial measurements
[AD-A089880] N80-34002
Equatorial spread F in situ measurements of electron density temperature and density fluctuation power spectra
[AD-A089133] N80-34008

EQUATORIAL ELECTROJET
Radar observations of the equatorial electrojet irregularities and theory of type 1 turbulence N80-33990

EQUILIBRIUM EQUATIONS
Numerical analysis of equilibrium problems in incompressible nonlinear elasticity N80-33763

EQUILIBRIUM METHODS
The equilibrium field near the tip of a crack for finite plane strain of incompressible elastic materials
[AD-A089838] N80-33800

EROSION
Mechanisms of erosion
[AD-A088571] N80-33498
Metal surface damage due to cavitation erosion
[BLL-RTS-12268] N80-33543
A three dimensional finite difference model of the transport of suspended sediment
[CSIR-RR-359] N80-33962

ERROR ANALYSIS
Synchronization tolerance to receiving errors in coded EM and PCM signals transmitted by meteorological satellites
[INPE-1760-RPE/149] N80-33644
A method of correcting daily and monthly values of atmospheric precipitation and results of tests on it
[BLL-TRANS-1451-(9022.549)] N80-34029
An investigation of type 1 error rate for approximate F tests of linear combinations of mean squares N80-34175
Errors in finite-difference computations on curvilinear coordinate systems
[NASA-CR-163601] N80-34178
On one-dimensional stretching functions for finite-difference calculations
[NASA-CR-3313] N80-34188

ERROR CORRECTING CODES
Theory and design of undirectional error codes N80-34141

ERROR DETECTION CODES
Impact of cell size on inventory and mapping errors in a cellular geographic information system
[E80-10315] N80-33831
Theory and design of undirectional error codes N80-34141

ERROR FUNCTIONS
Steady state spurious errors in shock-capturing numerical schemes
[KTH-AERO-TN-60] N80-33353

ESCALATORS
Overview of escalator applications in rail transit
[NASA-CR-163633] N80-34296

ESTIMATING
Estimation of the population total when the sample is taken from a list containing an unknown amount of duplication N80-34198
Estimation of the larger mean
[AD-A089661] N80-34204

ETCHING
Effects of flank protection media in the etching of copper — thiourea
[BLL-RTS-12359] N80-33539
Frosted solar cell covers — optical properties N80-33877

ETHYLENE
A film of large scale field experiments on ethylene hazards N80-33589

EULER EQUATIONS OF MOTION
Numerical studies of dispersion processes in two dimensional, homogeneous, decaying turbulence N80-33700
A compendium of computational fluid dynamics at the Langley Research Center
[NASA-TM-81877] N80-33716

EUROPEAN COMMUNICATIONS SATELLITE
The ECS solar array N80-33879

EUTECTIC ALLOYS
Control of solidification structures and properties of industrial Al-Si alloys
[BLL-RTS-11916] N80-33544
Directional solidification of nonoxide eutectics
[AD-A089585] N80-33557

EUTECTICS
Application of solidification theory to rapid solification processing
[AD-A089036] N80-33480

EUTROPHICATION
Assessment of the role of remote sensing in the study of inland and coastal waters
[NASA-TM-81581] N80-34048

EVALUATION
Satellite communication performance evaluation: Computational techniques based on moments
[NASA-CR-163629] N80-33640
Evaluation of cranking characteristics of commercially available batteries between room temperature and -40 C
[AD-A080614] N80-33906

EVAPORATION RATE
Defining relationships between surface characteristics and actual evaporation rate
[E80-10335] N80-33834

EVAPOTRANSPIRATION
Defining relationships between surface characteristics and actual evaporation rate
[E80-10335] N80-33834

EXCITATION
Assigning reactive excited states in inorganic photochemistry
[AD-A089568] N80-33521
Radiative capture studies of the electromagnetic decays of highly excited states
[DOE/ER-01398/443] N80-33667
Energy transfer in ionic and molecular systems N80-34222

EXERCISE PHYSIOLOGY
Human acclimation and acclimatization to heat: A compendium of research, 1968-1978 — Bibliography
[NASA-TM-81181] N80-34056

EXHALATION
Effects of different hygenic factors on exhalation of acetone by man N80-34078

EXHAUST EMISSION
Methanol/ethanol/gasoline blend fuels demonstration with stratified charge engine vehicles
[PB80-192123] N80-33606
Current techniques for the elimination of airbourne mists and soluble solids N80-33940

EXHAUST GASES
Energy efficient engine
[NASA-CR-159685] N80-33408
Determination of pollutant emissions characteristics of General Electric CF6-6 and CF6-50 model engines
[AD-A089927] N80-33412
The assessment of smoke emission from diesel-engined vehicles N80-33935
The perturbation of some atmospheric mechanisms by emissions from aircraft
[AD-A089100] N80-33965
Engineering reference manual for coding NEDS (National Emissions Data System) and EIS/P and R (Emission Inventory Subsystem/Permits and Registration) forms
[PB80-194665] N80-34289

EXHAUST NOZZLES
Numerical method for predicting flow characteristics and performance of nonaxisymmetric nozzles. Part 2: Applications
[NASA-CR-3264] N80-33354
Study for conceptual design of VEO, VTOL exhaust nozzle
[NASA-CR-152398] N80-33397

EXHAUST SYSTEMS
Plenum response to simulated disturbances of the model and fan inlet guide vanes in a transonic tunnel
[NASA-TM-81869] N80-33418

EXOBIOLOGY
Cytochemical studies of planetary microorganisms explorations in exobiology
[NASA-CR-163605] N80-34057
USSR Report: Space Biology and Aerospace Medicine, volume 14, no. 4, 1980
[JPRS-76415] N80-34058
Aerospace medicine and biology. A continuing bibliography with indexes, supplement 210, September 1980
[NASA-SP-7011(210)] N80-34088
Publications of the exobiology program for 1979: A special bibliography
[NASA-TM-82182] N80-34106

EXPANDABLE STRUCTURES
Telescopic masts for deployment of flexible solar arrays N80-33881

EXPLORER 50 SATELLITE
IMP 8. Volume 1: EM field experiment
[NASA-CR-160023] N80-33450
IMP-8. Volume 2: Scientific section — Bibliography
[NASA-CR-160024] N80-33451

EXPLOSIONS
Cathodic corrosion-protection in areas subject to explosion hazards
[BLL-T4934/BG/ERS/79(9022.048)] N80-33542

EXPLOSIVES
TNT equivalency testing of chemical mixtures in continuous TNT manufacturing
[AD-A088903] N80-33600

EXPOSURE
Evaluation and prediction of long term space environmental effects on non-metallic materials
[NASA-CR-161585] N80-33479

EXTRATERRESTRIAL ENVIRONMENTS
Cosmic-ray produced radionuclides in extraterrestrial material — lunar samples, meteorites, and iron spherules in Pacific clay N80-34332

EXTRATERRESTRIAL INTELLIGENCE
The SETI instrument development plan N80-33430
A bimodal search strategy for SETI N80-33431

EXTRATERRESTRIAL LIFE
Cytochemical studies of planetary microorganisms explorations in exobiology
[NASA-CR-163605] N80-34057
Publications of the exobiology program for 1979: A special bibliography
[NASA-TM-82182] N80-34106

EXTRATERRESTRIAL RADIATION
Computer assisted performance tests of the Lyman Alpha Coronagraph
[NASA-CR-163622] N80-33462

EXTRAVEHICULAR ACTIVITY
Extravehicular Crewman Work System (ECWS) study program. Volume 1: Executive summary
[NASA-CR-163597] N80-34101
Extravehicular Crewman Work System (ECWS) study program. Volume 3: Satellite service
[NASA-CR-163599] N80-34103
Extravehicular Crewman Work System (ECWS) study program. Volume 4: Program evolution
[NASA-CR-163600] N80-34104

EXTREME ULTRAVIOLET RADIATION
Extreme ultra-violet emission from coronal structures
[AD-A087803] N80 34329

F

F REGION
Equatorial spread F in situ measurements of electron density temperature and density fluctuation power spectra
[AD-A089133] N80-34008

F-14 AIRCRAFT
Flow visualization study of the F-14 fighter aircraft configuration
[NASA-CR-163098] N80-33350

FABRICATION
Research on low temperature, directed energy processing of very large scale integrated structures
[AD-A088562] N80-33621
Development of an electrophoretic image display
[AD-A089121] N80-33729
Two approaches towards a low power solid state laser N80-33734

FACTOR ANALYSIS
An investigation of type 1 error rate for approximate F tests of linear combinations of mean squares N80-34175

FACTORIAL DESIGN
Rejection of a single outlier in a factorial design [CSIR-TWISK-117] N80-34179
Location of multiple outliers in factorial designs, using tetrads [CSIR-TWISK-127] N80-34181

FAILURE ANALYSIS
Influence of quality control variables on failure of graphite/epoxy under extreme moisture conditions [NASA-TM-81246] N80-33493
NASTRAN analysis of heat-transfer fluid fill pipe failure N80-33790

FAILURE MODES
Fatigue failure criteria for unidirectional fiber composites [AD-A088733] N80-33500
Design for the prevention of progressive collapse using interactive computer graphics N80-33767

FAR FIELDS
Analytical compensation for near-field probe positioning errors in calculated far-field antenna patterns N80-33628

FARM CROPS
The potential of energy farming in the southeastern California desert [PB80-195019] N80-33921

FATIGUE (BIOLOGY)
Human acclimation and acclimatization to heat: A compendium of research, 1968-1978 — Bibliography [NASA-TM-81181] N80-34056
Differences in certain physiological, biomechanical, and subjective measures of work effect between males and females while backpacking N80-34089

FATIGUE (MATERIALS)
Fatigue failure criteria for unidirectional fiber composites [AD-A088733] N80-33500
Material characterization for studing flexible pavement behavior in fatigue and permanent deformation N80-33611
An electrical method of measuring strain and damage N80-33620
Analysis and synthesis of operational loads [RAE-LIB-TRANS-2108(5207)] N80-33757
The Shock and Vibration Digest, volume 12, number 8 [AD-A088658] N80-33758
Equivalence techniques for vibration testing N80-33760
Three-dimensional finite element analysis of cyclic fatigue crack growth of multiple surface flaws N80-33768
Stress gradients around notches [LR-297] N80-33779
A one-pass method for counting range mean pair cycle for fatigue analysis [ARL-STRUC-NOTE-454] N80-33781
A crack opening displacement approach to crack patching [ARL/STRUC-NOTE-455] N80-33797
Analysis of residual stresses resulting from cold rolling of notches and their effect on fatigue behavior [AD-A089110] N80-33807
Report on visit to Europe in May 1979, covering the 16th Meetings of the International Committee on Aeronautical Fatigue and Associated Visits [AD-A074392] N80-34339

FATIGUE TESTS
Fatigue testing of vampire wings [ARL/STRUC-REPT-378] N80-33399
Experimental investigation of the crack growth gage [AD-A089137] N80-33801

FAULT TOLERANCE
RAMP: A fault tolerant distributed microcomputer structure for aircraft navigation and control [NASA-CR-163615] N80-33415
SUMC fault tolerant computer system [NASA-CR-161581] N80-34111

FEASIBILITY ANALYSIS
Energy efficient engine [NASA-CR-159635] N80-33408
Drag-free estimation feasibility study [NASA-CR-163635] N80-33454
The development of mixture injected surface-ignition engine N80-33519

FEEDBACK
Longitudinal stability and control in wind shear with energy height rate feedback [NASA-TM-81828] N80-33416

FEEDBACK CONTROL
Across three (active control of space structures), phase 1 [AD-A089142] N80-33481
The stability of planar dynamical systems linear-in-cones [CSIR-TWISK-137] N80-34212

FERMIONS
Instantons and fermion densities N80-34273

FERROMAGNETIC MATERIALS
A study of RF nonlinearities in nickel [AD-A088770] N80-33562
The danger of intermodulation generation by RF connector hardware containing ferromagnetic materials [AD-A088768] N80-33657
Intrinsic sources of IM generation [AD-A088771] N80-33658

FERROUS METALS
Correlation between segregation and cold cracking [BLL-TRANS-4253-(9091.9F)] N80-33531

FIBER COMPOSITES
Dynamic fractures in orthotropic fiber composites N80-33486
Fatigue failure criteria for unidirectional fiber composites [AD-A088733] N80-33500
A crack opening displacement approach to crack patching [ARL/STRUC-NOTE-455] N80-33797

FIBER OPTICS
Experimental optical fiber communications link N80-33439
Digital phase modulated fiber optical communication system N80-33631
Intercommunications in real time, redundant, distributed computer system [NASA-CR-163604] N80-33642
A fiber optic transmission line stabilization apparatus and method [NASA-CASE-NPO-15036-1] N80-34250
Design of a fiber optic data link for the Ground Launched Cruise Missile [AD-A088847] N80-34252
Synthesis of generalized coherent optical processor [AD-A088669] N80-34253

FIBER REINFORCED COMPOSITES
An investigation of the electrochemical behavior of graphite fiber-polymer composites N80-33485

FIBER RELEASE
Carbon/graphite fiber risk analysis and assessment study: Assessment of risk to the Lockheed Model L-1011 commercial transport aircraft [NASA-CR-159201] N80-33487
Carbon/graphite fiber risk analysis and assessment study: An assessment of the risk to Douglas commercial transport aircraft [NASA-CR-159212] N80-33488
Experimental and analytical studies for the NASA carbon fiber risk assessment [NASA-CR-159214] N80-33490
Carbon fiber plume sampling for large scale fire tests at Dugway Proving Ground — fiber release during aircraft fires [NASA-CR-159215] N80-33492
Process modifications for improved carbon fiber composites: Alleviation of the electrical hazards problem [NASA-CR-163631] N80-33494

FIBERS
Corrosion of fiber composites with aluminum alloy matrixes [AD-A088564] N80-33563

FIELD EFFECT TRANSISTORS
Characterization and theory of electrolyte-insulator-semiconductor field-effect transistor N80-33678

FIELD OF VIEW
Optimal properties of the circular array for use as an adaptive antenna [AD-A088592] N80-33665

FIELD THEORY (PHYSICS)
A study of hybrid computing techniques for transonic flow fields [AD-A088662] N80-33360
An investigation of certain fundamental invariance properties of field theories including gravitational theories with torsion N80-33987
Effects of heavy particles at low energies N80-34231
Instantons and fermion densities N80-34273
Selected studies in classical and quantum field theory N80-34274
Quantum field-theoretical electromagnetic and gravitational two-particle potentials N80-34275

FILM CONDENSATION
Laminar film flow phenomena-theory and application to the two-phase closed thermosyphon N80-33700

FINITE DIFFERENCE THEORY
Calculation of three-dimensional unsteady transonic flows past helicopter blades [NASA-TP-1721] N80-33356
A rapid implicit-explicit solution to the two-dimensional time dependent incompressible Navier-Stokes equations [NASA-CR-3330] N80-33718
On the design verification of large flexible solar arrays: First experiences gained N80-33997
A three dimensional finite difference model of the transport of suspended sediment [CSIR-RR-359] N80-33962
Boundary approximation and time step control in iterative improvement for the numerical solution of partial differential equations N80-34170
Errors in finite-difference computations on curvilinear coordinate systems [NASA-CR-163601] N80-34178
On one-dimensional stretching functions for finite-difference calculations [NASA-CR-3313] N80-34188

FINITE ELEMENT METHOD
On the performance of explicit and implicit algorithms for transient thermal analysis [NASA-TM-81880] N80-33715
Effect of surface ellipticity on dynamically loaded spherical and cylindrical joints and bearings N80-33766
Three-dimensional finite element analysis of cyclic fatigue crack growth of multiple surface flaws N80-33768
Finite element analysis for elasto visco-plastic materials N80-33770
Geometrically nonlinear analysis of rectangular glass panels by the finite element method N80-33776
Ninth NASTRAN Users' Colloquium [NASA-CP-2151] N80-33782
On the application of nonlinear load elements to thermal analyses using the NASTRAN thermal analyzer N80-33789
NASTRAN analysis of heat-transfer fluid fill pipe failure N80-33790
A NASTRAN investigation of simulated projectile damage effects on a UH-1B tail boom model N80-33791
Finite circular plate on elastic foundation controlly loaded by rigid spherical indenter N80-33792
Elastic-plastic analysis using a triangular ring element in NASTRAN N80-33793
Comparison of finite element analysis of a piping tee using NASTRAN and CORTES/SA N80-33795
Variational methods of convolution integral and of large spring constants: A numerical comparison [AD-A088902] N80-34193
A feasibility study of a 3-D finite element solution scheme for aeroengine duct acoustics [NASA-CR-159359] N80-34216
Finite element modeling of the coupled thermal and momentum diffusion equations [AD-A088668] N80-34277

FIRE CONTROL
Design of a fiber optic data link for the Ground Launched Cruise Missile [AD-A088847] N80-34252
Advanced electro-optical tracker/ranger [AD-A089143] N80-34254

FIRE DAMAGE
Electronic equipment vulnerability to fire released carbon fibers [NASA-TM-80219] N80-33491

FIRES
Carbon fiber plume sampling for large scale fire tests at Dugway Proving Ground — fiber release during aircraft fires [NASA-CR-159215] N80-33492

Process modifications for improved carbon fiber composites: Alleviation of the electrical hazards problem
[NASA-CR-163631] N80-33494
Catalytic incineration of graphite fibers in a graphite-epoxy composite fire
[AD-A089897] N80-33503

FLAME HOLDERS
Conceptual model of turbulent flameholding for scramjet combustors
[NASA-TP-1543] N80-33409

FLAME PROPAGATION
Conceptual model of turbulent flameholding for scramjet combustors
[NASA-TP-1543] N80-33409
Discussion on explosion hazards — conference proceedings, Goettingen, West Germany, 24 Aug. 1979
[MPIS-23/1979] N80-33582
Research on vapor cloud explosions and related phenomena in Canada N80-33583
The gas cloud explosion program on the PNP-project — prototype plant nuclear process heat N80-33587
Research on vapor cloud explosions in the United Kingdom N80-33588
Some comments on the Discussion on Explosion Hazards N80-33590
Description of research related to vapor cloud explosions in the Netherlands N80-33591
Vapor cloud explosion studies in the United States N80-33595
The burning velocity inside a spark-ignition engine with different turbulent promoters N80-33746

FLAME TEMPERATURE
Spatially resolved studies of flame and plasma as sources for atomic spectroscopy N80-33511

FLAMEOUT
Conceptual model of turbulent flameholding for scramjet combustors
[NASA-TP-1543] N80-33409

FLAMMABILITY
Hybridized polymer matrix composites
[NASA-CR-165146] N80-33489
Electronic equipment vulnerability to fire released carbon fibers
[NASA-TM-80219] N80-33491

FLAPPING
Comparison of calculated and measured helicopter rotor lateral flapping angles
[NASA-TM-81213] N80-33349

FLEET SATELLITE COMMUNICATION SYSTEM
FLTSATCOM-D
[NASA-NEWS-RELEASE-80-158] N80-33424
Launch mission summary: FLTSATCOM-D Atlas/Centaur-57
[NASA-TM-82213] N80-33452

FLEXIBILITY
On Irwins and Achenbachs expressions for the energy release rate
[AD-A089118] N80-33803

FLEXIBLE BODIES
The dynamics and control of large flexible space structures. Volume 3, part B: The modeling, dynamics, and stability of large Earth pointing orbiting structures
[NASA-CR-163612] N80-33449

FLIGHT CHARACTERISTICS
The oblique wing-research aircraft N80-33338
Flying qualities design criteria
[AD-A089629] N80-33402
Helicopter flight test instrumentation
[AGARD-AG-160-VOL-10] N80-33406
Advanced simulator for pilot training: Design of automated performance measurement system
[AD-A088955] N80-33421

FLIGHT CONTROL
Sea King Mk. 50 helicopter sonar dynamics study. A simplified control systems mathematical model
[AR-001-607] N80-33395
Digital flight control research using microprocessor technology
[AD-A089147] N80-33417

FLIGHT PATHS
Washington National Airport flight extension test. Noise monitoring data report
[AD-A089111] N80-33966

FLIGHT PLANS
Automated flight plan filing by simulated voice recognition
[AD-A089138] N80-34105

FLIGHT SAFETY
Aviation safety: DC-10 crash of May 25, 1979
[GPO-54-572] N80-33383
Analysis of general aviation single-pilot IFR incident data obtained from the NASA aviation safety reporting system
[NASA-TM-80206] N80-33384

FLIGHT SIMULATION
Experimental techniques in unsteady aerodynamics N80-33373
Pilot/vehicle model analysis of visual and motion cue requirements in flight simulation — helicopter hovering
[NASA-CR-3312] N80-33398
Validation of the rotorcraft flight simulation program (C81) using operational loads survey flight test data
[AD-A089008] N80-33422
Effects of criteria on flight simulation study 1: Heading deviation tolerance
[AD-A089908] N80-33423
Dynamic evaluation of experimental integral fuel-tank sealants, part 1
[AD-A089573] N80-33573
Synthesized voice approach callouts for air transport operations
[NASA-CR-3300] N80-34096

FLIGHT SIMULATORS
Advanced simulator for pilot training: Design of automated performance measurement system
[AD-A088955] N80-33421

FLIGHT STABILITY TESTS
A flight investigation of performance and loads for a helicopter with 10-64C main rotor blade sections
[NASA-TM-81671] N80-33348

FLIGHT STRESS (BIOLOGY)
Data handling in the medical experiment of the Spacelab Preparatory Program ASSESS 2
[DFVLR-MITT-79-02] N80-34114

FLIGHT TEST INSTRUMENTS
Helicopter flight test instrumentation
[AGARD-AG-160-VOL-10] N80-33406
Pressure and flow measurement — flight testing
[AGARD-AG-160-VOL-11] N80-33407

FLIGHT TESTS
Technical Review, volume 15, no. 1
[ISSUE-1] N80-33337
NASA general aviation stall/spin flight testing N80-33340
Aircraft crash survival design guide. Volume 3: Aircraft structural crashworthiness
[AD-A089104] N80-33385
Precision I-band DME tests
[AD-A089053] N80-33388
Development and test results of a flight management algorithm for fuel conservative descents in a time-based metered traffic environment
[NASA-TP-1717] N80-33404

FLOOD PLAINS
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland
[E80-10228] N80-33829

FLOW CHARACTERISTICS
Introduction to unsteady boundary layers N80-33365
Some features of linear compressibility N80-33367

FLOW CHARTS
Voice response system statistics program, operational handbook
[AD-A089109] N80-34031
Automatic flowsheet drawing for the computer aided design of chemical processes using interactive computer graphics N80-34144

FLOW DISTRIBUTION
Numerical method for predicting flow characteristics and performance of nonaxisymmetric nozzles. Part 2: Applications
[NASA-CR-3264] N80-33354
A study of hybrid computing techniques for transonic flow fields
[AD-A089662] N80-33360
Measurements of boundary layer flow over a forested mountain slope N80-34018
Changes in the potential for wind energy generation due to terrain modification of the boundary-layer flow N80-34020

FLOW EQUATIONS
Prediction methods for unsteady separated flows N80-33376
Numerical solution techniques for unsteady transonic aerodynamics problems N80-33379
Linearised methods in supersonic flow N80-33380
Pulsating flow and heat transfer in curved tubes N80-33712

FLOW MEASUREMENT
Pressure and flow measurement — flight testing
[AGARD-AG-160-VOL-11] N80-33407
Flows in the annular region when an underexpanded nozzle is exhausted into a stepped launch tube
[AD-A088581] N80-33477

FLOW STABILITY
On the swelling of rolled up vortex surfaces and the breakdown of the vortex core for slender wings
[NASA-TM-75862] N80-33346

FLOW VELOCITY
A comprehensive investigation into the supersonic viscous flow about a slender cone at high angle of attack: Experimental and theoretical results N80-33344

FLOW VISUALIZATION
Flow visualization study of the F-14 fighter aircraft configuration
[NASA-CR-163098] N80-33350

FLUES
Stack gas reheat evaluation
[PB80-196850] N80-33980

FLUID DYNAMICS
A compendium of computational fluid dynamics at the Langley Research Center
[NASA-TM-81877] N80-33716
The extended Rayleigh theory of the oscillation of liquid droplets
[AD-A088894] N80-33724

FLUID FLOW
Flow visualization study of the F-14 fighter aircraft configuration
[NASA-CR-163098] N80-33350
La Recherche Aerospatiale, Bi-monthly Bulletin no. 1980-1
[ESA-TT-651] N80-33613
Numerical studies of dispersion processes in two dimensional, homogeneous, decaying turbulence N80-33709
Analysis of in-line flow-induced vibrations using linearization methods N80-33710
Pulsating flow and heat transfer in curved tubes N80-33712
Computation of discrete hole film cooling flow
[AD-A088807] N80-33723
Orographic effects in planetary flows
[GARP-PUBL-23] N80-33811
Laboratory studies of topographic effects in rotating and/or stratified fluids N80-33819

FLUIDIZED BED PROCESSORS
The pressurized fluidized bed gasification of coal char
[BLL-RTS-12347] N80-33575
The fluidized bed gasification of coal char
[BLL-RTS-12346] N80-33576
Single particle gas-solid reactions and their application to modeling of fluidized bed coal combustors and ash agglomerating gasifiers N80-33578
Fluidized-bed combustion for pollution control N80-33936

FLUORESCENCE
Batch processing with the radioiodine laser induced-fluorescence detector
[AD-A088773] N80-33968

FLUORINE COMPOUNDS
Fluorinated desensitizing ingredients for propellants
[AD-A088704] N80-33598
Optical and magnetic resonance studies of energy transfer in inorganic molecular solids
[AD-A088567] N80-34271

FLUTTER ANALYSIS
Evaluation of Aero Commander sidewall vibration and interior acoustic data: Static operations
[NASA-CR-159290] N80-33392

FLUX (RATE)
Surface energy budget of the Tropical Pacific Ocean
[AD-A089148] N80-34030

The minimum flux corona; theory or concept
[NASA-CR-163636] N80-34328

FLUX DENSITY
Mechanisms responsible for topographical changes in PLT stainless steel and graphite limiters
[PPPL-1671] N80-33584
Radiative transfer in one dimensional, discretely stratified media
[AD-A088885] N80-33653
Radio spectral characteristics of extragalactic objects N80-34333
Relativistic effects in extragalactic radio sources N80-34335
A precise measurement of the sidereal anisotropy of cosmic rays near 1500 GV N80-34336

FLY BY WIRE CONTROL
Digital flight control research using microprocessor technology
[AD-A089147] N80-33417

FLYBY MISSIONS
Voyager 1: Encounter with Saturn
[NASA-NEWS-RELEASE-80-159] N80-34324

FLYWHEELS
Low-cost flywheel demonstration program
[CONS-5085-T2] N80-33909

FOILS (MATERIALS)
Ultrathin cell module technology — silicon N80-33876

FOLDING STRUCTURES
The ECS solar array N80-33879
SPOT solar array — for a three axis stabilized heliosynchronous satellite in an 800 km orbit N80-33880
Design and technology of solar arrays for shuttle launched missions N80-33883

FOOD
The use of solar energy for cooking N80-33953

FORCED VIBRATION
The forced oscillation of the circular plates
[BLL-RTS-12070] N80-33756

FORECASTING
Identifications and forecasting of the potential for the occurrence of extended-range VHF-UHF transhorizon propagation from synoptic-scale data N80-33630

FOREIGN TRADE
Energy policy: Supply and demand alternatives
[GPO-56-541] N80-33870

FOREST MANAGEMENT
A watershed information system N80-33625

FORESTS
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland
[E80-10229] N80-33829
Measurements of boundary layer flow over a forested mountain slope N80-34018

FORGING
Pilot plant forging of hydrogenated Ti-6Al-4V
[AD-A089107] N80-33558

FORM FACTORS
Determining the form factors of plane and cylindrical surfaces by numerical methods
[INPE-1815-RPE/183] N80-34185
Determination of surface active materials by square-wave polarography (polarography with rectangular wave)
[BLL-RTS-12170] N80-34243

FORMING TECHNIQUES
The behavior of inmold deoxidation in steel castings N80-33550

FORMULAS (MATHEMATICS)
Estimation of the population total when the sample is taken from a list containing an unknown amount of duplication N80-34198

FOUNDRIES
Control of solidification structures and properties of industrial Al-Si alloys
[BLL-RTS-11916] N80-33544

FOURIER ANALYSIS
Geologic implications of regional scale variation in lunar crater shape. Fourier crater shape analysis N80-34312

FRACTIONATION
Difficult gas-chromatographic separations: Isotopic fractionations and extracts of carbonaceous materials N80-33510

FRACTURE MECHANICS
Influence of stress interaction on the behavior of off-axis unidirectional composites
[NASA-CR-163618] N80-33495
Some formulas for the crack opening stress level
[M-368] N80-33780
On the dynamic energy release rate in elastic crack propagation
[AD-A089119] N80-33802
Stress intensity distributions for natural flaw shapes approximating benchmarch geometries
[PB80-200795] N80-33810

FRACTURE STRENGTH
Dynamic fractures in orthotropic fiber composites N80-33486
Directional solidification of nonoxide eutectics
[AD-A089585] N80-33557

FRAMES
General nonlinear computer analysis of framed structures N80-33769

FRANCE
Meteor and remote sensing satellites (a collection of articles)
[NASA-TM-76389] N80-33453

FREQUENCIES
Frequency re-use by polarization on diversity on satellite links
[BLL-TRANS-3663] N80-33625

FREQUENCY MODULATION
Telecommando transmission system for stratospheric balloons
[INPE-1830-RPE/194] N80-33645

FREQUENCY SHIFT
An investigation of continuous phase frequency shift keying as a modulation on additive impulsive atmospheric noise channels N80-33633

FREQUENCY STABILITY
Influence of the environmental conditions on a quartz resonator
[RAE-LIB-TRANS-1897(5207)] N80-33673
Frequency skipping in negative resistance oscillators with applications to crystal-controlled monolithic phase-locked loops N80-33677

FREQUENCY SYNCHRONIZATION
Synchronization tolerance to receiving errors in coded EM and PCM signals transmitted by meteorological satellites
[INPE-1760-RPE/149] N80-33644

FRESNEL INTEGRALS
On the application of the GTD-MM technique and its limitations
[AD-A088806] N80-33655

FRONTS (METEOROLOGY)
Workshop for Forecasting Droughts in Northeast Brazil
[INPE-1739-RPE/138] N80-34027

FROST DAMAGE
Workshop for Forecasting Droughts in Northeast Brazil
[INPE-1739-RPE/138] N80-34027

FUEL COMBUSTION
Fluidized-bed combustion for pollution control N80-33938

FUEL CONSUMPTION
Development and test results of a flight management algorithm for fuel conservative descents in a time-based metered traffic environment
[NASA-TP-1717] N80-33404
Experimental determination of the admittances of solid propellants by the impedance tube technique N80-33464
Methanol/ethanol/gasoline blend fuels demonstration with stratified charge engine vehicles
[PB80-192123] N80-33606
Potential of spark ignition engine, electronic engine and transmission control
[PB80-192701] N80-33751
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 2: Residual-fired nocogeneration process boiler
[NASA-CR-159770-PT-2] N80-33861
Working group on fuel consumption targets
[NP-24333] N80-33910

FUEL GAGES
Ultrasound level-meter for measuring propellant levels in Ariane tanks in its first and second stages N80-33615

FUEL INJECTION
The development of mixture injected surface-ignition engine N80-33519

FUEL PRODUCTION
Oversight: Alternate liquid fuels technology
[GPO-50-313] N80-33580

FUEL SPRAYS
Vaporization of droplets in premixing chambers
[NASA-CR-163616] N80-33714

FUEL TANKS
Dynamic evaluation of experimental integral fuel-tank sealants, part 1
[AD-A088573] N80-33573

FUELS
Municipal refuse as a fuel for power generation N80-33960
Utilization of municipal refuse as an energy source N80-33952

FUMES
Development and validation of methods for sampling and analysis of workplace toxic substances
[PB80-194574] N80-34095

FUNCTION SPACE
On reversible transformations of space elements
[AD-A080447] N80-34202

FUNCTIONS (MATHEMATICS)
On one-dimensional stretching functions for finite-difference calculations
[NASA-CR-3313] N80-34188
Structures and algorithms in stochastic realization theory and the smoothing problem
[AD-A088485] N80-34192

FUSELAGES
Evaluation of Aero Commander sidewall vibration and interior acoustic data: Static operations
[NASA-CR-158290] N80-33392
Development and analysis of the learjet 54/55 fuselage NASTRAN model using substructure techniques N80-33794

G

GALACTIC CLUSTERS
WQ 2059-247: An unusual high redshift X-ray cluster
[NASA-CR-163619] N80-34307

GALACTIC RADIATION
WQ 2059-247: An unusual high redshift X-ray cluster
[NASA-CR-163619] N80-34307

GALACTIC STRUCTURE
N-body simulations of stellar systems containing massive black holes N80-34309

GALAXIES
N-body simulations of stellar systems containing massive black holes N80-34309

GALLIUM ARSENIDES
Development of space-qualified GaAs solar cells N80-33888

GAME THEORY
Learning algorithms for two person zero-sum stochastic games with incomplete information: A unified approach
[S/IS-7908] N80-34150

GAMMA RAY SPECTROMETERS
Measurements of secondary cosmic radiation aboard a jet aircraft at altitudes of 12 and 12.5 km over Boa Vista and Campinas
[INPE-1808-RPE/176] N80-34337

GAMMA RAY TELESCOPES
Astronomical telescope for photons-gamma rays of low energy (approximately 4 MeV using the difference method like a Venetian blind
[INPE-1807-RPE/175] N80-34306

GAMMA RAYS
Positron annihilation gamma ray lineshape studies of defects in solids
[AD-A088856] N80-34267

GAS ANALYSIS
Instrumentation development for LASSII equatorial measurements
[AD-A088880] N80-34002

GAS BEARINGS
Experimental investigation of hydrodynamic self-acting gas bearings at high Knudsen numbers N80-33744

GAS CHROMATOGRAPHY
Difficult gas-chromatographic separations: Isotopic fractionations and extracts of carbonaceous materials N80-33510

Source emission measurements of volatile organic chemicals
[PB80-196518] N80-33874

GAS DISSOCIATION
A study of the processes in the RF hydrogen gas dissociator N80-33438

GAS DYNAMICS
High temperature gas energy transfer
[AD-A088129] N80-34236

GAS EXPLOSIONS
Discussion on explosion hazards — conference proceedings, Goettingen, West Germany, 24 Aug. 1979
[MPIS-23/1979] N80-33582
Research on vapor cloud explosions and related phenomena in Canada N80-33583
Explosion hazards in the Suez Canal: An overview N80-33584
Unconfined hydrocarbon air mixture explosion studies performed in France by CEA-EDF-GDF and the University N80-33585
Explosion hazards of transport gases: Research within the reactor safety program of the Federal Republic of Germany N80-33586
The gas cloud explosion program on the PNP-project — prototype plant nuclear process heat N80-33587
Research on vapor cloud explosions in the United Kingdom N80-33588
A film of large scale field experiments on ethylene hazards N80-33589
Some comments on the Discussion on Explosion Hazards N80-33590
Description of research related to vapor cloud explosions in the Netherlands N80-33591
Large scale gas explosion experiments in Norway N80-33592
Vapor cloud explosion studies in the United States N80-33595

GAS FLOW
Electrostatic precipitation research in Japan
[PB80-194137] N80-33875

GAS IONIZATION
Molecular beam chemiluminescent investigation of the inelastic collisions of rare gas metastable atoms N80-34223

GAS TURBINES
Regression modeling of turbine engine performance
[AD-A088696] N80-33411

GAS-ION INTERACTIONS
Ion-ion neutralization
[AD-A080200] N80-34001
Inclusive study of 200 GeV/c pi-neon interactions N80-34232

GAS-SOLID INTERFACES
Single particle gas-solid reactions and their application to modeling of fluidized bed coal combustors and ash agglomerating gasifiers N80-33578
Selective reflection of light at a solid-gas interface and its application N80-34244

GASES
Hygiene and toxicology of human waste gases N80-34059
Development and validation of methods for sampling and analysis of workplace toxic substances
[PB80-194574] N80-34095

GASIFICATION
Oxygen/system gasification of wood
[PNL-3353] N80-33605

GASOHOL (FUEL)
Methanol/ethanol/gasoline blend fuels demonstration with stratified charge engine vehicles
[PB80-192123] N80-33606

GASOLINE
Evaluation of processes for producing gasoline from wood
[DOE/PE-70048/T2] N80-33602

GAUSS EQUATION
Analysis of in-line flow-induced vibrations using linearization methods N80-33710

GELS
Preparation of homogeneous living polyvinyl gels with application to solvent purification
[AD-A088683] N80-33574

GENERAL AVIATION AIRCRAFT
NASA general aviation stall/spin flight testing N80-33340
Rotary balance data for a typical single-engine general aviation design for an angle of attack range of 8 deg to 90 deg. 1: Low wing model C — wind tunnel tests
[NASA-CR-3200] N80-33355
Analysis of general aviation single-pilot IFR incident data obtained from the NASA aviation safety reporting system
[NASA-TM-80206] N80-33384

GENETICS
Cytochemical studies of planetary microorganisms explorations in exobiology
[NASA-CR-163605] N80-34057

GEOCHEMISTRY
Comparative petrology of the Apollo 11 mare basalt, part 1. The oxygen isotope geochemistry of the Abitibi greenstone belt, part 2 N80-34313

GEODESY
Geodetic positioning using a global positioning system of satellites
[NASA-CR-163609] N80-33991
NASA plan for international crustal dynamics studies
[NASA-TM-82214] N80-34000

GEODETIC COORDINATES
Improved algorithm for calculation of UTM and geodetic coordinates — Jacobi elliptic functions
[NOAA-S/T-80-281] N80-33836

GEODETIC SATELLITES
Geodetic positioning using a global positioning system of satellites
[NASA-CR-163609] N80-33991

GEODETIC SURVEYS
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research
[NASA-TM-82215] N80-33999

GEODYNAMICS
Fundamentals studies in geodynamics
[NASA-CR-163620] N80-33993

GEOGRAPHY
Impact of cell size on inventory and mapping errors in a cellular geographic information system
[E80-10315] N80-33831

GEOLOGICAL SURVEYS
The United States space observation policy
[NASA-TM-76373] N80-33425
Contributions of LANDSAT imagery to the geological mapping of the Rio do Grande Sul Shield — Brazil
[INPE-1838-RPE/199] N80-33842

GEOMETRY
Topics in analysis
[AD-A080463] N80-34189

GEOMORPHOLOGY
A multi-step method for avalanche zone recognition and analysis — San Juan Mountains (co) N80-33824

GEOPHYSICAL SATELLITES
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research
[NASA-TM-82215] N80-33999

GEOPHYSICS
Laboratory studies of topographic effects in rotating and/or stratified fluids N80-33819
Gravity geophysical dimension of buried channel aquifers in the dissected till plains of northern Missouri
[PB80-194343] N80-33851
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 1: Optical auroral images and related direct measurements
[NASA-TM-81121] N80-33997
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research
[NASA-TM-82215] N80-33999
Solar terrestrial physics services and publications 1980
[PB80-199136] N80-34012

GEOSYNCHRONOUS ORBITS
Synchronous Energy Technology
[NASA-CP-2154] N80-33465
Synchronous energy technology program N80-33466
Spacecraft system overview of space power at geostationary Earth Orbit N80-33469
Photovoltaic technology development for synchronous orbit N80-33470
Large solar arrays N80-33471
A comparison of solar array radiation damage models N80-33891

GEOTHERMAL ENERGY CONVERSION
Assessment of H2S control technologies for geothermal power plants
[PB80-193709] N80-33973

GEOTHERMAL ENERGY EXTRACTION
Preliminary study of the potential environmental concerns associated with surface waters and geothermal development of the Valles Caldera
[LA-8398-MS] N80-33969

GEOTHERMAL RESOURCES
Energy programs at the John Hopkins University Applied Physics Laboratory
[PB80-195316] N80-33919
Preliminary study of the potential environmental concerns associated with surface waters and geothermal development of the Valles Caldera
[LA-8398-MS] N80-33969
A multi-site magnetotelluric measurement system with real time data analysis N80-33988

GERMANIUM ALLOYS
Silicon germanium alloys for infrared detectors
[AD-A088732] N80-33502

GERMANY
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland
[E80-10228] N80-33829
Military weather calculations for the NATO theater: Weather and Warplanes 8
[AD-A088549] N80-34033

GIANT STARS
Spectra of late-type stars in the one to four micron region N80-34302
Mass loss from warm giants: Magnetic effects
[NASA-CR-163602] N80-34322

GLASS
Geometrically nonlinear analysis of rectangular glass panels by the finite element method N80-33776
Cleaning agents and techniques for concentrating solar collectors
[SAND-79-7052] N80-33911

GLAUBER THEORY
High-energy proton-proton elastic scattering N80-34236

GLOBAL ATMOSPHERIC RESEARCH PROGRAM
Orographic effects in planetary flows
[GARP-PUBL-23] N80-33811

GLOBAL POSITIONING SYSTEM
Geodetic positioning using a global positioning system of satellites
[NASA-CR-163609] N80-33991

GLOTTIS
A study of human throat-wall and vocal tract from input/output measurements N80-34091

GLOW DISCHARGES
Aspects of ionization and sputtering in the glow discharge by solids mass spectrometry N80-33508

GLUCOSE
Mathematical simulation of the transport of oxygen and important metabolites in the human brain N80-34092

GNOTOBIOTICS
Theoretical and applied aspects of the anabiosis of microorganisms
[BLL-RTS-12250] N80-34055

GOLD
The determination of uni and tri valent gold in acid gold baths
[BLL-RTS-12157] N80-33504
Selective electroplating processes
[BLL-RTS-11960] N80-33506

GOLD COATINGS
Hard-gold coatings deposited using pulsating current and their suitability for use in plug connections
[BLL-RTS-12203] N80-33524
The diffusion of copper into gold coatings at elevated temperatures
[BLL-RTS-12292] N80-33535
Noble metal electroplated coatings on printed circuit connectors — gold coatings
[BLL-RTS-12265] N80-33537

GOVERNMENT PROCUREMENT
Criteria for applying commercial aircraft warranties in USAF aircraft purchases
[AD-A088774] N80-33343

GOVERNMENT/INDUSTRY RELATIONS
Private sector involvement in civil space remote sensing. Volume 1: Report
[NASA-TM-82206] N80-33845
Private sector involvement in civil space remote sensing. Volume 2: Appendices
[NASA-TM-82207] N80-33846

GOVERNMENTS
Improving building construction specifications in state and local governments
[NASA-CR-163623] N80-33612

GRADIENTS
Stochastic network with recourse N80-34158
Optimal linear estimation applied to the generation of a direct method for investigating parameter optimization
[INPE-1855-RPE/209] N80-34187

GRAFTING
Radiation-induced graft polymerization of styrene onto cellulose esters N80-33566

GRAIN BOUNDARIES
The diffusion of copper into gold coatings at elevated temperatures
[BLL-RTS-12292] N80-33535
Local response of ITO/polysilicon solar cells N80-33855

GRANULAR MATERIALS
Enhancement of thermal energy transport through granular media N80-33702

GRAPH THEORY
A graph theory approach to software evaluation N80-34145

GRAPHITE
An investigation of the electrochemical behavior of graphite fiber-polymer composites N80-33485
Mechanisms responsible for topographical changes in PLT stainless steel and graphite limiters
[PPPL-1671] N80-33564

GRAVITATION
Drag-free estimation feasibility study
[NASA-CR-163635] N80-33454
Gravity geophysical dilineation of buried channel aquifers in the dissected till plains of northern Missouri
[PB80-194343] N80-33851

GRAVITATION THEORY
An investigation of certain fundamental invariance properties of field theories including gravitational theories with torsion N80-33987

GRAVITATIONAL FIELDS
Two dimensional smoothing of a vector Laplacian random field with application to geodesy N80-33982
Numerical study of baroclinic instability
[NASA-CR-161580] N80-33992
Quantum field-theoretical electromagnetic and gravitational two-particle potentials N80-34275

GRAVITATIONAL WAVES
Viscous flow near a sphere under surface gravity waves N80-33701

GRAVITY WAVES
The detection of atmospheric gravity waves by means of the wave interaction experiment N80-33989

GREAT BRITAIN
Structure, mechanism and prediction of orographically enhanced rain in Britain N80-33814

GREAT LAKES (NORTH AMERICA)
Great Lakes degree-day and temperature summaries and norms, 1897 - 1977
[PB80-195977] N80-34040

GREEN FUNCTION
Linearised methods in supersonic flow N80-33380
Power series expansion for a crossing-symmetric vertex function — the Green's function formulation of the many-body theory
[CSIR-TWISK-134] N80-34182

GROUND EFFECT MACHINES
Conceptual point design study of a new CTOL SETOLS CAS aircraft for 1995 IOC
[AD-A088351] N80-33400

GROUND STATIONS
Network functions and facilities N80-33433
DSN Ground Communications Facility N80-33434
Networks consolidation program N80-33442
Data collection platforms: A technique for space telemetry applied to surveying ambient parameters
[INPE-1743-RPE/139] N80-33459
ANIK-B Doc communications system and ground terminals
[CRC-TN-704-E] N80-33649

GROUND SUPPORT EQUIPMENT
Design of a fiber optic data link for the Ground Launched Cruise Missile
[AD-A088847] N80-34252

GROUND SUPPORT SYSTEMS
Mission operation report: Voyager program Voyager 1 encounter at Saturn November 12, 1980
[NASA-TM-82217] N80-33426

GROUND WATER
Ground water monitoring strategies to support community management of on-site home sewage disposal systems N80-33826
Gravity geophysical dilineation of buried channel aquifers in the dissected till plains of northern Missouri
[PB80-194343] N80-33851

GROUND WIND
Modification of the boundary layer by orography N80-33816
Changes in the potential for wind energy generation due to terrain modification of the boundary-layer flow N80-34020

GUATEMALA
A sensitivity analysis of volcanic aerosol dispersion in the stratosphere — Mt. Fuego, Guatemala eruptions
[NASA-CR-163806] N80-33926

H

HALL EFFECT
Silicon germanium alloys for infrared detectors
[AD-A088732] N80-33502

HANDWRITING
Reading handwritten words using hierarchical relaxation N80-34161

HANGARS
Energy conservation and management study of aircraft hangars at selected Air Force Bases
[AD-A089075] N80-33420

HARDNESS
Directional solidification of nonoxide eutectics
[AD-A086565] N80-33557

HARDWARE
Multiple Microprocessor System (MMS) design study, volume 2
[AD-A086066] N80-34180

HARMONIC ANALYSIS
Experimental unsteady aerodynamics of conventional and supercritical airfoils — conducted in the Ames 11 foot transonic wind tunnel
[NASA-TM-81221] N80-33345
Solution of enforced boundary motion in direct transient and harmonic problems N80-33788
Statistical relation between the solar cycle and drought in northeast Brazil
[INPE-1839-RPE/200] N80-34024
Geologic implications of regional scale variation in lunar crater shape. Fourier crater shape analysis N80-34312

HARMONIC MOTION
Analysis of in-line flow-induced vibrations using linearization methods N80-33710

HAZARDS
Experimental and analytical studies for the NASA carbon fiber risk assessment
[NASA-CR-159214] N80-33490
Rankine bottoming cycle safety analysis
[DOE/ET-15445/T1] N80-33912

HEALTH PHYSICS
Proceedings of the NATO Advanced Study Institute on Atmospheric Ozone and its variation and human influences
[AD-A088889] N80-34006

HEARING
Development and application of a brain stem audiometer N80-34086

HEART FUNCTION
New engineering approaches to noninvasive His-Purkinje system recordings N80-34087

HEART RATE
Effect of task variable interactions in lifting and lowering N80-34090

HEAT ACCLIMATIZATION
Human acclimation and acclimatization to heat: A compendium of research, 1968-1978 — Bibliography
[NASA-TM-81181] N80-34056

HEAT BALANCE
Thermal balance of soils
[INPE-1859-RPE/210] N80-33941

HEAT CAPACITY MAPPING MISSION
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland
[E80-10229] N80-33829
Impact of cell size on inventory and mapping errors in a cellular geographic information system
[E80-10315] N80-33831
Defining relationships between surface characteristics and actual evaporation rate
[E80-10335] N80-33834

HEAT EXCHANGERS
Thermal management for high power space platform systems N80-33472

HEAT FLUX
Turbulent heat transfer to liquid metals in a circular pipe N80-33705

HEAT RADIATORS
Properties of solar generators with reflectors and radiators — in a space environment N80-33901

HEAT SINKS
The use of sources and sinks in solving two-dimensional heat conduction problems with change of phase in arbitrary domains N80-33704
Dispersed flow heat transfer in circular tubes N80-33706
Vapors-liquid phase separator — infrared telescope heat sink
[NASA-CR-163621] N80-33717

HEAT SOURCES
The use of sources and sinks in solving two-dimensional heat conduction problems with change of phase in arbitrary domains N80-33704

HEAT STORAGE
Design package for solar domestic hot water system
[NASA-CR-161558] N80-33867

HEAT TRANSFER
Modeling of heat and mass transfer during coal block gasification N80-33577
The solution cycle in an absorption system with pressure equalising gas (theoretical and experimental investigations)
[BLL-RTS-12307] N80-33808
Droplet evaporation in high temperature environments N80-33696
The use of sources and sinks in solving two-dimensional heat conduction problems with change of phase in arbitrary domains N80-33704
Experimental investigations of the transport properties of flow suspensions. 1: Measurement of velocity distributions of suspension flows in a rectangular channel. 2: Experimental study of the effective thermal conductivity in shear flow of a suspension. 3: The use of fluorescence correlation spectroscopy to measure molecular diffusion and velocity distributions N80-33711
Pulsating flow and heat transfer in curved tubes N80-33712
On the performance of explicit and implicit algorithms for transient thermal analysis
[NASA-TM-81880] N80-33715
Computation of discrete hole film cooling flow
[AD-A088807] N80-33723
NASTRAN analysis of heat-transfer fluid fill pipe failure N80-33790
Planetary waves: Theory and observation — extratropical waves N80-33813
A numerical simulation of the influence of heat and moisture fluxes upon mesoscale circulations N80-34015
A two-dimensional diabatic isopycnal model of a coastal upwelling front N80-34043

HEAT TREATMENT
The use of current-less (chemical) nickel-plating in vacuum-and-precision- engineering
[BLL-RTS-12025] N80-33525
Correlation between segregation and cold cracking
[BLL-TRANS-4253-(9091.9F)] N80-33531

HEATING
Stack gas reheat evaluation
[PB80-196850] N80-33980

HEAVY ELEMENTS
Background aerosol concentrations for the Namib-Atlantic interface N80-33957
Heavy ions in Jupiter's environment [NASA-CR-163603] N80-34321
HEAVY IONS
Heavy ions in Jupiter's environment [NASA-CR-163603] N80-34321
HELICAL ANTENNAS
Platform antennas for data collection [INPE-1820-RPE/196] N80-33647
HELICOPTER CONTROL
Pilot/vehicle modal analysis of visual and motion cue requirements in flight simulation — helicopter hovering [NASA-CR-3312] N80-33398
HELICOPTER DESIGN
Calculation of three-dimensional unsteady transonic flows past helicopter blades [NASA-TP-1721] N80-33356
HELICOPTER PERFORMANCE
A flight investigation of performance and loads for a helicopter with 10-64C main rotor blade sections [NASA-TM-81871] N80-33348
Comparison of calculated and measured helicopter rotor lateral flapping angles [NASA-TM-81213] N80-33349
Analysis and correlation of test data from an advanced technology rotor system — helicopter performance prediction [NASA-CR-152366] N80-33351
Unsteady flows associated with helicopter rotors N80-33370
Helicopter flight test instrumentation [AGARD-AG-160-VOL-10] N80-33408
HELICOPTERS
Civil helicopter wire strike assessment study. Volume 1: Findings and recommendations [NASA-CR-152389] N80-33391
Sea King Mk. 50 helicopter sonar dynamics study. A simplified control systems mathematical model [AR-001-607] N80-33395
Installation of C-6533(XE-2)/ARC ICS in UH-1H helicopter [AD-A088708] N80-33650
An evaluation of a computer code based on linear acoustic theory for predicting helicopter main rotor noise — CH-53A and S-76 helicopters [NASA-CR-159339] N80-34217
HELIUM
HVEM studies of helium embrittlement in stainless steel N80-33547
Size effects in superfluid ^{3}He N80-33610
A study of the 10830 A line of neutral helium in the spectra of red giants N80-34303
HELIUM FILM
Superfluidity in ^{3}He-^{4}He mixture thin films N80-33609
HELMETS
Installation of C-6533(XE-2)/ARC ICS in UH-1H helicopter [AD-A088708] N80-33650
HEMODYNAMIC RESPONSES
Reactions to LBNP test of the crew of the Salyut 5 orbital station N80-34061
HERMITIAN POLYNOMIAL
The size of numbers in the analysis of certain algorithms N80-34142
HETERODYNING
Open-loop radio science with a suppressed-carrier signal N80-33440
Comparative performance of HgCdTe photodiodes for heterodyne application [NASA-TP-1745] N80-33683
Atmospheric solar absorption measurements in the 9 to 11 mu m region using a diode laser heterodyne spectrometer [NASA-TP-1726] N80-33998
HEURISTIC METHODS
Forward linear programming N80-34143
How near is a near-optimal solution: Confidence limits for the global optimum [AD-A089108] N80-34203
Maximum likelihood estimation for stationary point processes [AD-A089117] N80-34205
Evaluation of precedence criteria for project scheduling under resource constraints [AD-A089070] N80-34282
HEXAGONAL CELLS
Elastic waves hexagonal honeycomb N80-33634
HIERARCHIES
Application of a hierarchical structure stochastic learning automaton [S-18-7906] N80-34151
Reading handwritten words using hierarchical relaxation N80-34161
HIGH ALTITUDE BALLOONS
Telecommando transmission system for stratospheric balloons [INPE-1830-RPE/194] N80-33645
HIGH ENERGY INTERACTIONS
High-energy proton-proton elastic scattering N80-34236
HIGH ENERGY PROPELLANTS
Application of picosecond and light scattering spectroscopies to the study of energetic materials [AD-A088904] N80-33596
HIGH FREQUENCIES
Syncompex: A voice processing system for low cost HF radio telephony [CRC-1316-E] N80-33648
HIGH GAIN
High power millimeter wave amplifier [AD-A080591] N80-33695
HIGH PRESSURE
Effects of ultra-high pressures on methanol, ethanol, calcium oxide, rutile, cassiterite, and germanium dioxide N80-33515
HIGH SPEED
Effect of cage design on characteristics of high-speed-jet-lubricated 35-millimeter-bore ball bearing — turbojet engines [NASA-TP-1732] N80-33749
HIGH TEMPERATURE
Droplet evaporation in high temperature environments N80-33696
The characterization of the crack growth behaviour of alloy IN-100 at elevated temperature under sustained load N80-33765
High temperature gas energy transfer [AD-A089129] N80-34235
HIGH TEMPERATURE ENVIRONMENTS
LARC-13 adhesive development [NASA-CR-159317] N80-33497
HIGH TEMPERATURE TESTS
Homogeneous vapor phase nucleation of large polar molecules under Limiting experimental conditions: High temperatures, low pressures, and long growth times — cloud chamber studies N80-34224
HIGH VOLTAGES
In situ experiments in the 1 MV electron microscope. Part 1: Feasibility and methodology N80-33618
Technology of elevated voltage solar arrays — 250 kW N80-33803
HIGHLANDS
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland [E80-10228] N80-33829
HIS BUNDLE
New engineering approaches to noninvasive His-Purkinje system recordings N80-34087
HISTOLOGY
Morphological changes in rat lungs after flight aboard the Cosmos-936 biosatellite N80-34066
Histostructural correlations in the hypothalamus-hypophysis-kidneys system under hypokinetic conditions N80-34075
HODOGRAPHS
Reverse pseudo-unsteady aerodynamic calculation methods N80-33816
HOLE DISTRIBUTION (MECHANICS)
Stress gradients around notches [LR-297] N80-33779
HOLLOW CATHODES
Baffle aperture design study of hollow cathode equipped ion thrusters [NASA-CR-165164] N80-33476
HOLOGRAMMETRY
Applications of computer-generated holograms in optical testing N80-33727
HOMEOSTASIS
The role of temperature in experiments on biological objects under extreme conditions N80-34080
HOMOMORPHISMS
A formal program model for discrete event simulation and its use in the verification and validation of system models and implementations N80-34139
Generalized addition sets N80-34171
HONEYCOMB STRUCTURES
Elastic waves hexagonal honeycomb N80-33634
HORN ANTENNAS
Pattern measurements of a low-sidelobe horn antenna N80-33429
HOVERCRAFT GROUND EFFECT MACHINES
A case study of environmental noise evaluation [NPL-AR-96] N80-33925
HOVERING
Stability of nonuniform rotor blades in hover using a mixed formulation [NASA-TM-81226] N80-33777
HUMAN BODY
Effect of periodic exposure to head-pelvis accelerations on a short-arm centrifuge on responses of the human cardiovascular system N80-34071
HUMAN FACTORS ENGINEERING
Loss of consciousness in high performance fighters (what to do about it) N80-33341
Health requirements for advanced coal extraction systems [NASA-CR-163265] N80-34093
Development and validation of methods for sampling and analysis of workplace toxic substances [PB80-194574] N80-34095
Passenger comfort technology for system decision making [NASA-TM-81875] N80-34098
Extravehicular Crewman Work System (ECWS) study program. Volume 2: Construction [NASA-CR-163696] N80-34102
Automated flight plan filing by simulated voice recognition [AD-A089138] N80-34105
HUMAN PERFORMANCE
Automation literature: A brief review and analysis [NASA-TM-81245] N80-34097
Development of neurophysiological and behavioral metrics of human performance [AD-A087840] N80-34100
HUMAN REACTIONS
Proceedings of the NATO Advanced Study Institute on Atmospheric Ozone and its variation and human influences [AD-A088999] N80-34006
HUMAN TOLERANCES
Human acclimation and acclimatization to heat: A compendium of research, 1968-1978 — Bibliography [NASA-TM-81181] N80-34056
HUMAN WASTES
Hygiene and toxicology of human waste gases N80-34059
HUMIDITY
Aerosol modelling for optical weather [AD-A089563] N80-34034
HYBRID CIRCUITS
Integrated screen printed hybrid circuits [BLL-PO-TRANS-3749-(7737.470)] N80-33669
HYBRID COMPUTERS
A study of hybrid computing techniques for transonic flow fields [AD-A088662] N80-33380
HYDROCARBON COMBUSTION
Unconfined hydrocarbon air mixture explosion studies performed in France by CEA-EDF-GDF and the University N80-33585
Explosion hazards of transport gases: Research within the reactor safety program of the Federal Republic of Germany N80-33586
The gas cloud explosion program on the PNP-project — prototype plant nuclear process heat N80-33587
Research on vapor cloud explosions in the United Kingdom N80-33588
A film of large scale field experiments on ethylene hazards N80-33589
Some comments on the Discussion on Explosion Hazards N80-33590
Description of research related to vapor cloud explosions in the Netherlands N80-33591
Large scale gas explosion experiments in Norway N80-33592
HYDROCARBON FUELS
Superheating and boiling of water in hydrocarbons and of hydrocarbon mixtures N80-33709

HYDROCARBONS
Energy efficient engine
[NASA-CR-159665] N80-33408
Fluorinated desensitizing ingredients for propellants
[AD-A088704] N80-33598
HYDRODYNAMICS
Experimental investigation of hydrodynamic self-acting gas bearings at high Knudsen numbers N80-33744
HYDROELECTRICITY
Evaluation of hydropower potential in a river basin — Prediction analysis technique N80-33856
Energy programs at the John Hopkins University Applied Physics Laboratory
[PB80-195316] N80-33919
HYDROGEN
Oxygen and nitrogen nuclear magnetic resonance studies of amides and aromatic aldehydes and ketones N80-33514
The deposition of palladium coatings with low hydrogen content and stress in sulphuric acid electrolyte
[BLL-RT-12267] N80-33534
Hydrogen transport in nickel base superalloys N80-33552
HYDROGEN FUELS
Hydrogen use as a fuel. Citations from the NTIS data base
[PB80-813090] N80-33607
HYDROGEN MASERS
A study of the processes in the RF hydrogen gas dissociator N80-33438
HYDROGEN PRODUCTION
Hydrogen use as a fuel. Citations from the NTIS data base
[PB80-813090] N80-33607
HYDROGEN SULFIDE
Assessment of H2S control technologies for geothermal power plants
[PB80-193709] N80-33973
HYDROGENATION
Pilot plant forging of hydrogenated Ti-6Al-4V
[AD-A089107] N80-33558
HYDROGRAPHY
Properties of the oceans reflected in the sea-bed distribution of quaternary planktonic Foraminifera: Including a study of the limits of empirical Paleo-Oceanographic models and the recognition and interpretation of faunal assemblages lacking modern counterparts N80-34047
HYDROLOGY MODELS
Coastal currents: Study of a model applied to the coast of Rio Grande do Sul latitude 29 deg south to 35 deg south
[INPE-1841-RPE/201] N80-33844
HYDROMETERS
Determination of atmospheric water vapor from dewpoint measurement
[PB80-197189] N80-34039
HYDROXYL RADICALS
Fixation of Zn(ii) ions on metal oxide surfaces
[BLL-RTS-12200] N80-34262
HYGIENE
Hygiene and toxicology of human waste gases N80-34059
Effects of different hygienic factors on extinction of acetone by man N80-34078
HYPERBARIC CHAMBERS
The use of computer-controlled manipulators in underwater technology
[DFVLR-MITT-78-02] N80-34117
HYPERBOLIC DIFFERENTIAL EQUATIONS
Boundary controllability of hyperbolic partial differential equations
[CSIR-TWISK-126] N80-34180
HYPOKINESIA
Effect of antiorthostatic hypokinesia and space flight factors on change in leg volume N80-34072
Histostructural correlations in the hypothalamus-hypophysis-kidneys system under hypokinetic conditions N80-34075
Distribution of benzene in tissues of hypokinetic animals N80-34083
HYPOTHALAMUS
Histostructural correlations in the hypothalamus-hypophysis-kidneys system under hypokinetic conditions N80-34075
HYPOXIA
Effect of conditioning animals for hypoxia on their resistance to poison inhalation N80-34076

I

IAPETUS
Saturn: Origin and composition of its inner moons and rings
[NASA-CR-163630] N80-34320
IBM 370 COMPUTER
Use of the operating system OS-MVS in the technical and scientific field
[DFVLR-MITT-79-02] N80-34121
ICE
An investigation of the heat transfer at the liquid/solid interface of rapidly melting ice
[AD-A089099] N80-33722
A numerical study of the efficiency with which aerosol particles collide with simple planar ice crystals N80-33985
ICE FORMATION
Statistical classification of ice particles and raindrops by pattern recognition techniques N80-34021
Icing characteristics of low altitude, supercooled layer clouds, revision
[AD-A088992] N80-34036
ICE NUCLEI
A study of ice nucleus concentrations in eastern New York State N80-34017
IDENTITIES
Generalized inverses and their application to applied probability problems — Markov chains
[AD-A089089] N80-34207
IGNITION
Role of surface chemistry in the ignition of pyrotechnic materials
[MLM-2708(OP)] N80-33603
IGNITION SYSTEMS
The development of mixture injected surface-ignition engine N80-33519
ILLUMINATING
Spectral distributions 5: Visible spectra of standard and improved green flare compositions
[AD-A089055] N80-33557
IMAGE CONTRAST
MAPS image compression
[AD-A088783] N80-34153
IMAGE ENHANCEMENT
Digital filtering of LANDSAT images as a visual aid technique in geological photointerpretation
[INPE-1823-RPE/189] N80-33843
IMAGE PROCESSING
High speed lookup table approach to radiometric calibration of multispectral image data
[NASA-TP-1741] N80-33463
Utilization of spectral-spatial information in the classification of imagery data
[E80-10321] N80-33832
Bonne's projection of Meteosat images — subroutines
[CSIR-SR-RIS-201] N80-33837
A method for edge detection in images of natural resources
[INPE-1768-RPE/154] N80-33840
Interactive digital image processing investigation, phase 2
[AD-A087518] N80-33848
Algorithm for extracting data from meteorological satellites for use in estimating precipitation
[INPE-1769-RPE/155] N80-34026
Image feature manuscript generation
[AD-A088884] N80-34152
Artificial intelligence: Promises or results?
[INPE-1834-RPE/196] N80-34184
Digital image processing of conventional transmission electron micrographs N80-34226
Correction, correlation, and theoretical consideration of lunar X-ray fluorescence intensity ratios N80-34315
IMAGE RESOLUTION
Alternatives for the development of future television systems
[BLL-RTS-12332] N80-33626
IMAGERY
Development of an electrophoretic image display
[AD-A089121] N80-33729
IMAGES
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 1: Optical auroral images and related direct measurements
[NASA-TM-81121] N80-33997
IMAGING TECHNIQUES
Digital image processing in ion microscope analysis: Methods of image quantification
[AD-A088792] N80-33059
Effects of magnification and visual accommodation on simpoint estimation in simulated landings with real and virtual image displays
[NASA-TP-1835] N80-34099
MAPS image compression
[AD-A088783] N80-34153
Synthesis of generalized coherent optical processor
[AD-A088869] N80-34253
An application of digital image techniques to the high-velocity material in NGC 1275 N80-34304
IMIDES
LARC-13 adhesive development
[NASA-CR-159317] N80-33497
IMPACT DAMAGE
A NASTRAN investigation of simulated projectile damage effects on a UH-1B tail boom model N80-33791
IMPACT LOADS
Impact force prediction using measured frequency response functions N80-33773
IMPACT PREDICTION
Impact force prediction using measured frequency response functions N80-33773
IMPACT STRENGTH
Hybridized polymer matrix composites
[NASA-CR-165146] N80-33489
IMPACT TESTS
Mechanisms of erosion
[AD-A088571] N80-33498
Localized impact problems of composite laminates N80-33759
IMPEDANCE
High power millimeter wave amplifier
[AD-A088591] N80-33695
IMPEDANCE MEASUREMENTS
Experimental determination of the admittances of solid propellants by the impedance tube technique N80-33484
IN-FLIGHT MONITORING
Pressure and flow measurement — flight testing
[AGARD-AG-160-VOL-11] N80-33407
In-flight characteristics of the topside ionospheric monitor (SSIE) on the DMSP satellite flight 2 and flight 4
[AD-A088879] N80-34005
INCIDENT RADIATION
Acoustic plane waves incident on an oblique clamped panel in a rectangular duct
[KU-FRL-417-14] N80-34215
INCINERATORS
Catalytic incineration of graphite fibers in a graphite-epoxy composite fire
[AD-A088897] N80-33503
INCOMPRESSIBLE FLOW
A simple method for converting frequency domain aerodynamics to the time domain
[NASA-TM-81844] N80-33358
Study of laminar and turbulent flow in ducts of polar cross-section N80-33699
A rapid implicit-explicit solution to the two-dimensional time dependent incompressible Navier-Stokes equations
[NASA-CR-3330] N80-33718
INCOMPRESSIBLE FLUIDS
Vibrations of several obstacles within the two dimensional flow of incompressible fluid N80-33614
INCONEL (TRADEMARK)
The characterization of the crack growth behaviour of alloy IN-100 at elevated temperature under sustained load N80-33765
INDEPENDENT VARIABLES
Parameter estimation in undetermined systems N80-34172
INDEXES (DOCUMENTATION)
NASA patent abstracts bibliography. A continuing bibliography with indexes, supplement 17, section 2, July 1980
[NASA-SP-7039(17)-SECTION-2] N80-34284

INDIAN OCEAN
Orographically controlled cross-equatorial flow N80-33921
Climatic maps of the sea surface-air difference in vapour pressure and in potential temperature over the western Indian Ocean
[AD-A089022] N80-34050

INDIUM
Studies of indium-doped silicon — infrared detector development
[AD-A088736] N80-34269

INDUSTRIAL ENERGY
Cogeneration Technology Alternatives Study (CTAS). Volume 4: Energy conversion systems
[NASA-CR-159709] N80-33859
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 2: Residual-fired cogeneration process boiler
[NASA-CR-159770-PT-2] N80-33861
Energy conservation-air pollution abatement project N80-33939

INDUSTRIAL SAFETY
Long deposition of aerosols from industrial environments N80-33933
Health requirements for advanced coal extraction systems
[NASA-CR-163265] N80-34593

INDUSTRIAL WASTES
Bright dipping solution for iron-nickel-cobalt alloys
[BLL-RTS-12158] N80-33529
International conference on Air Pollution, volume 2
[ISBN-0-7569-1085-1] N80-33936
Current techniques for the elimination of airborne mists and soluble solids N80-33940
Developments in industrial emission measurements: Progress towards an automated isokinetic sampler N80-33945

INERTIAL NAVIGATION
Inertial navigation and guidance. Citations from the NTIS data base
[PB80-812415] N80-33389

INFECTIOUS DISEASES
Preflight distinctions of Staphylococcus aureus carriers among cosmonauts N80-34062

INFORMATION DISSEMINATION
Announcement services and publications N80-34293

INFORMATION MANAGEMENT
Planning a DSN support section technical library N80-33436
Manual of documentation practices applicable to defense-aerospace scientific and technical information. Volume 2: Data recording and storage, mechanization systems and operations, announcement service and publications
[AGARD-AG-235-VOL-2] N80-34290
Mechanization systems and operations N80-34292

INFORMATION RETRIEVAL
The self-training interpretive and retrieval system: Improved substructure perception N80-33509
Environmental assessment data systems: Terminology reference manual
[PB80-197916] N80-34288

INFORMATION SYSTEMS
Digital Avionics Information System (DAIS): Life cycle cost impact modeling system Reliability, Maintainability, and Cost Model (RMCM): User's guide
[AD-A089045] N80-33495
Planning a DSN support section technical library N80-33436
Improving building construction specifications in state and local governments
[NASA-CR-163623] N80-33612
Impact of cell size on inventory and mapping errors in a cellular geographic information system
[E80-10315] N80-33831
The revised organic chemical producers data base system
[PB80-199805] N80-34287

INFORMATION THEORY
A study of RF nonlinearities in nickel
[AD-A088770] N80-33562
Identification of a nonlinear system by means of the modified GMDH
[BLL-TRANS-1446] N80-34135

INFRARED ASTRONOMY
Voyager 1: Encounter with Saturn
[NASA-NEWS-RELEASE-80-159] N80-34324

INFRARED DETECTORS
Silicon germanium alloys for infrared detectors
[AD-A089732] N80-33502
In situ doping of thin Ca (x)Hg (1-x)Te films obtained by cathode sputtering in mercury vapour. Application to the production of infrared detectors
[BLL-RTS-11980] N80-33528
A 2.06 micron-laser rangefinder technology
[AD-A088836] N80-33737
Studies of indium-doped silicon — infrared detector development
[AD-A088736] N80-34269

INFRARED IMAGERY
A multi-step method for avalanche zone recognition and analysis — San Juan Mountains (co)
N80-33824
Algorithm for extracting data from meteorological satellites for use in estimating precipitation
[INPE-1769-RPE/155] N80-34026

INFRARED LASERS
A 2.06 micron-laser rangefinder technology
[AD-A088836] N80-33737

INFRARED PHOTOGRAPHY
Meteor and remote sensing satellites (a collection of articles)
[NASA-TM-76369] N80-33453

INFRARED RADIATION
Turbid water measurements of remote sensing penetration depth at visible and near-infrared wavelength
[NASA-TM-81843] N80-33827

INFRARED SPECTROPHOTOMETERS
Meeting of the IRIS specialty group on infrared detectors, volume 1
[ERIM-139600-3-X(I)] N80-34241

INFRARED TELESCOPES
Vapors-liquid phase separator — infrared telescope heat sink
[NASA-CR-163621] N80-33717

INFRARED TRACKING
Atmospheric solar absorption measurements in the 9 to 11 mu m region using a diode laser heterodyne spectrometer
[NASA-TP-1728] N80-33996

INJECTION LASERS
Mode structure of Al sub xGa sub 1-xAs injection lasers N80-33733
Single-mode laser studies: Design and performance of a fixed-wave length source and coupling of lasers to thin-film optical waveguides
[NASA-CR-3341] N80-33735

INLAND WATERS
Assessment of the role of remote sensing in the study of inland and coastal waters
[NASA-TM-81881] N80-34048

INSERTION LOSS
Filter project with a planar circuit in the waveguide
[INPE-1817-RPE/185] N80-33680

INSOLATION
Installation, operation, and maintenance for the pyramidal optics solar system installed at Yacht Cover, Columbia, South Carolina
[NASA-CR-161203] N80-33864

INSTRUMENT COMPENSATION
Analytical compensation for near-field probe positioning errors in calculated far-field antenna patterns N80-33626

INSTRUMENT FLIGHT RULES
Analysis of general aviation single-pilot IFR incident data obtained from the NASA aviation safety reporting system
[NASA-TM-80206] N80-33384

INSULATED STRUCTURES
On the performance of explicit and implicit algorithms for transient thermal analysis
[NASA-TM-81880] N80-33715

INTAKE SYSTEMS
Measurement of turbine engine transient airflow in ground test facilities
[AD-A088706] N80-33414

INTEGRAL EQUATIONS
A numerical boundary integral equation method for transient motions N80-34158
Applications of non-self-adjoint operator theory to the Singularity Expansion Method (SEM) and the Eigenmode Expansion Method (EEM) in acoustic and electromagnetic problems
[AD-A088747] N80-34191

INTEGRATED CIRCUITS
Integrated screen printed hybrid circuits
[BLL-PO-TRANS-3749-(7737.470)] N80-33689

INTERFEROMETERS
Applications of computer-generated holograms in optical testing N80-33727

INTERFEROMETRY
Experimental investigation of hydrodynamic self-acting gas bearings at high Knudsen numbers N80-33744
Radar observations of the equatorial electrojet irregularities and theory of type 1 turbulence N80-33990

INTERMODULATION
The danger of intermodulation generation by RF connector hardware containing ferromagnetic materials
[AD-A088768] N80-33657
Intrinsic sources of IM generation
[AD-A088771] N80-33658

INTERNAL COMBUSTION ENGINES
The development of mixture injected surface-ignition engine N80-33519
Potential of spark ignition engine, electronic engine and transmission control
[PB80-192701] N80-33751

INTERNAL WAVES
Long wave trapping by a linear ridge topography
[AD-A088840] N80-34051

INTERNATIONAL SOLAR POLAR MISSION
International solar polar mission N80-33437

INVARIANCE
An investigation of certain fundamental invariance properties of field theories including gravitational theories with torsion N80-33987

INVENTORY MANAGEMENT
Analysis of Markov renewal processes with some nonregeneration points and their applications to reliability theory N80-33753

INVISCID FLOW
Some features of linear compressibility N80-33367
Method for inviscid subsonic flows about aircraft configurations N80-33368
Methods for inviscid subsonic flows about unsteady aerofoils N80-33375

IODIDES
Testing iodized activated carbon filters with nonradioactive methyl iodide
[AD-A088686] N80-33522

IODINE ISOTOPES
Batch processing with the radioiodine laser induced-fluorescence detector
[AD-A088773] N80-33968

IODINE LASERS
Batch processing with the radioiodine laser induced-fluorescence detector
[AD-A088773] N80-33968

ION BEAMS
Experimental electron-impact excitation and ionization of positive ions N80-34226
Construction and testing of an ion photofragment momentum spectrometer
[AD-A089753] N80-34238

ION CHARGE
The determination of uni and tri valent gold in acid gold baths
[BLL-RTS-12157] N80-33504

ION CONCENTRATION
The determination of uni and tri valent gold in acid gold baths
[BLL-RTS-12157] N80-33504
Electroplating: Metal deposits by electrolysis, throwing power
[BLL-RTS-11870] N80-33527

ION CURRENTS
Baffle aperture design study of hollow cathode equipped ion thrusters
[NASA-CR-165164] N80-33478

ION DENSITY (CONCENTRATION)
Instrumentation development for LASSII equatorial measurements
[AD-A088880] N80-34002
In-flight characteristics of the topside ionospheric monitor (SSIE) on the DMSP satellite flight 2 and flight 4
[AD-A088879] N80-34005

ION ENGINES
Baffle aperture design study of hollow cathode equipped ion thrusters
[NASA-CR-165164] N80-33476
ION EXCHANGING
Regenerations of critical process solutions relative to recoveries of valuable substances
[BLL-RTS-12141] N80-33505
ION IMPLANTATION
Photovoltaic technology development for synchronous orbit N80-33470
Study of strain distribution in helium implanted vanadium three silicon by the divergent X-ray beam method N80-33548
Digital image processing in ion microscope analysis: Methods of image quantification
[AD-A088792] N80-33559
Ion implantation of wide bandgap semiconductors
[AD-A089026] N80-34268
ION IRRADIATION
The action of water vapour on ion irradiated alkali silicate glasses
[AD-A089023] N80-33572
Ion-beam-induced modifications of thin film structures and formation of metastable phases N80-34265
ION MICROSCOPES
Digital image processing in ion microscope analysis: Methods of image quantification
[AD-A088792] N80-33559
ION PROPULSION
Employment of a digital computer in the tests to ascertain the useful life of the thruster RIT 10
[DFVLR-MITT-78-02] N80-34125
IONIC WAVES
Research in aeronomy
[NASA-CR-163610] N80-33996
IONIZATION
Aspects of ionization and sputtering in the glow discharge by solids mass spectrometry N80-33508
Steady state treatment of relativistic electron beam erosion
[AD-A089047] N80-34237
IONIZATION CROSS SECTIONS
Experimental electron-impact excitation and ionization of positive ions N80-34226
Low energy atomic collisions
[AD-A088748] N80-34234
IONIZING RADIATION
Low-level ionizing radiation
[GPO-50-084] N80-33964
IONOSPHERE
Geomagnetic activity and the equatorial scintillation of satellite signals
[AD-A088848] N80-33652
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 1: Optical auroral images and related direct measurements
[NASA-TM-81121] N80-33997
Atmospheric/ionospheric/magnetospheric h using the Chatanika radar
[AD-A088915] N80-34004
In-flight characteristics of the topside ionospheric monitor (ISIE) on the DMSP satellite flight 2 and flight 4
[AD-A088879] N80-34005
Solar terrestrial physics services and publications 1980
[PB80-199136] N80-34012
IONOSPHERIC DISTURBANCES
Instrumentation development for LASSII equatorial measurements
[AD-A088880] N80-34002
Equatorial spread F in situ measurements of electron density temperature and density fluctuation power spectra
[AD-A089133] N80-34008
IONOSPHERIC F-SCATTER PROPAGATION
Solar-terrestrial predictions proceedings. Volume 4: Prediction of terrestrial effects of solar activity
[PB80-200025] N80-34011
IONOSPHERIC PROPAGATION
Research in aeronomy
[NASA-CR-163610] N80-33996
IONOSPHERICS
ORION S-band data acquisition for S-Y calibration --- radio interferometer networks N80-33432
IONS
Ionic interactions in the liquid state by multinuclear magnetic resonance N80-33518
Collective acceleration of ions in vacuum N80-34230
IRIDIUM
Optical and magnetic resonance studies of energy transfer in inorganic molecular solids
[AD-A088567] N80-34271
IRON
Origin of magnetic properties in amorphous metals
[AD-A089145] N80-33560
IRON ALLOYS
Electron microscopical investigation on the age hardening of spring alloys based on Co-Ni-Cr-Fe
[BLL-RTS-12152] N80-33526
The behavior of inmold deoxidation in steel castings N80-33550
Fracture and flow of iron and its alloys: Theory and experiment N80-33554
IRRADIATION
HVEM studies of helium embrittlement in stainless steel N80-33547
Continuous irradiation methods for nuclear resonance line-narrowing N80-34233
ISIS SATELLITES
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 1: Optical auroral images and related direct measurements
[NASA-TM-81121] N80-33997
ISOPYCNIC PROCESSES
A two-dimensional diabatic isopycnal model of a coastal upwelling front N80-34043
ISOSTATIC PRESSURE
Wave information study for United States coastlines. Report 1: Surface pressure field reconstruction for wave hindcasting purposes
[AD-A089150] N80-34029
ITERATION
Boundary approximation and time step control in iterative improvement for the numerical solution of partial differential equations N80-34170
ITERATIVE SOLUTION
On the convergence of a block successive overrelaxation method for a class of linear complementarity problems
[AD-A088760] N80-34154
A feasibility study of a 3-D finite element solution scheme for aeroengine duct acoustics
[NASA-CR-159359] N80-34218

J

JACOBI INTEGRAL
Improved algorithm for calculation of UTM and geodetic coordinates --- Jacobi elliptic functions
[NOAA-S/T-80-281] N80-33836
JAPAN
Electrostatic precipitation research in Japan
[PB80-194137] N80-33975
JET AIRCRAFT
Implications of requiring new production of older aircraft types (less than 75,000 pounds) to meet amended noise standards
[AD-A088577] N80-33967
JET AIRCRAFT NOISE
Detection and assessment of secondary sonic booms in New England
[AD-A088160] N80-33362
Washington National Airport flight extension test. Noise monitoring data report
[AD-A089111] N80-33966
JET ENGINE FUELS
Hydroprocessing of light pyrolysis fuel oil for kerosene type jet fuel
[AD-A089101] N80-33599
JET ENGINES
Measurement of turbine engine transient airflow in ground test facilities
[AD-A088706] N80-33414
Implications of requiring new production of older aircraft types (less than 75,000 pounds) to meet amended noise standards
[AD-A088577] N80-33967
JET EXHAUST
The perturbation of some atmospheric mechanisms by emissions from aircraft
[AD-A089100] N80-33965
JET FLOW
Coherent structures in the similarity region of a two-dimensional turbulent jet: A vortex street
[AD-A088750] N80-33720
JET IMPINGEMENT
Crystallization under nonuniform conditions --- in jet impingement N80-34266
JET LAG
Effects of transmeridional flights and highland conditions on different forms of memory N80-34088
JET STREAMS (METEOROLOGY)
Orographically controlled cross-equatorial flow N80-33821
JIGS
Manufacturing of space telescope solar array blankets N80-33875
JOINTS (ANATOMY)
Extravehicular Crewman Work System (ECWS) study program. Volume 2: Construction
[NASA-CR-163998] N80-34102
JOINTS (JUNCTIONS)
Effect of surface ellipticity on dynamically loaded spherical and cylindrical joints and bearings N80-33766
JOURNAL BEARINGS
A modeling technique for design and simulation of hydrostatic journal bearings N80-33745
JUPITER (PLANET)
The Jovian magnetosphere N80-34318
Voyager encounters Jupiter
[NASA-CR-163607] N80-34318
JUPITER ATMOSPHERE
The Jovian magnetosphere N80-34318
Heavy ions in Jupiter's environment
[NASA-CR-163603] N80-34321
JUPITER PROBES
Voyager encounters Jupiter
[NASA-CR-163607] N80-34318

K

KALMAN FILTERS
Asymptotic analysis of linear filtering problems N80-34177
Optimal linear estimation applied to the generation of a direct method for investigating parameter optimization
[INPE-1855-RPE/209] N80-34187
KARMAN VORTEX STREET
Orographic effects revealed by satellite pictures: Mesoscale flow phenomena N80-33820
KERNEL FUNCTIONS
Torsion theory and modules of finite length N80-34173
KIDNEYS
Morphological study of rat kidneys after flight aboard the Cosmos-936 biosatellite N80-34065
Histostructural correlations in the hypothalamus-hypophysis-kidneys system under hypokinetic conditions N80-34075
KINETIC EQUATIONS
Stimulated emission processes from free electrons N80-33732
Phonon-induced nonequilibrium states in superconducting films: A kinetic equation study N80-34263
KINETICS
Radiation-induced graft polymerization of styrene onto cellulose esters N80-33566
KNUDSEN FLOW
Experimental investigation of hydrodynamic self-acting gas bearings at high Knudsen numbers N80-33744
KOVAR (TRADEMARK)
Bright dipping solution for iron-nickel-cobalt alloys
[BLL-RTS-12198] N80-33529

L

L-1011 AIRCRAFT
Carbon/graphite fiber risk analysis and assessment study: Assessment of risk to the Lockheed Model L-1011 commercial transport aircraft
[NASA-CR-159201] N80-33487

LACTIC ACID
Mathematical simulation of the transport of oxygen and important metabolites in the human brain
N80-34092

LAGRANGE COORDINATES
Numerical studies of dispersion processes in two dimensional, homogeneous, decaying turbulence
N80-33790

LAKE ONTARIO
Spectral growth and nonlinear characteristics of wind waves in Lake Ontario
[PB80-193261] N80-33650

LAMELLA (METALLURGY)
The mechanical pretreatment of printed circuit boards
[BLL-RTS-12263] N80-33671

LAMINAR FLOW
Analytical methods for prediction of unsteady laminar boundary layers N80-33376
Study of laminar and turbulent flow in ducts of polar cross-section N80-33699
Laminar film flow phenomena-theory and application to the two-phase closed thermosyphon N80-33703
A rapid implicit-explicit solution to the two-dimensional time dependent incompressible Navier-Stokes equations
[NASA-CR-3330] N80-33718

LAMINAR HEAT TRANSFER
Dispersed flow heat transfer in circular tubes N80-33706
Calculation of laminar heating rates on three-dimensional configurations using the axisymmetric analogue
[NASA-TP-1698] N80-33719

LAMINATES
Tackifier for addition polyimides
[NASA-TM-81883] N80-33570

LANDAU DAMPING
Two examples of the decay instability in an inhomogeneous plasma N80-34259

LANDING SIMULATION
Effects of magnification and visual accommodation on simpoint estimation in simulated landings with real and virtual image displays
[NASA-TP-1635] N80-34088

LANDSAT SATELLITES
Meteor and remote sensing satellites (a collection of articles)
[NASA-TM-76369] N80-33453

LANGUAGE PROGRAMMING
Artificial intelligence: Promises or results?
[INPE-1934-RPE/196] N80-34164

LAPLACE TRANSFORMATION
Two dimensional smoothing of a vector Laplacian random field with application to geodesy N80-33962

LARGE SCALE INTEGRATION
Research on low temperature, directed energy processing of very large scale integrated structures
[AD-A089562] N80-33621

LARGE SPACE STRUCTURES
The dynamics and control of large flexible space structures. Volume 3, part B: The modelling, dynamics, and stability of large Earth pointing orbiting structures
[NASA-CR-163612] N80-33449
Synchronous energy technology program N80-33466
Large solar arrays N80-33471
Extravehicular Crewman Work System (ECWS) study program. Volume 2: Construction
[NASA-CR-163698] N80-34102

LARGE SPACE TELESCOPE
The solar cell blanket design for space telescope's roll-out solar array N80-33674
Manufacturing of space telescope solar array blankets N80-33675

LASER APPLICATIONS
Vaporization of droplets in premixing chambers
[NASA-CR-163616] N80-33714
Single-mode laser studies: Design and performance of a fixed-wave length source and coupling of lasers to thin-film optical waveguides
[NASA-CR-3341] N80-33735

LASER DAMAGE
The effects of laser radiation on pyrolytic silicon nitride coatings on slip-cast fused silica substrates
[AD-A089130] N80-33738

LASER DOPPLER VELOCIMETERS
Experimental techniques for unsteady boundary layers N80-33374

LASER FUSION
Nova: A high energy laser system
[UCRL-83204] N80-33740

LASER MODES
Mode structure of Al sub xGa sub 1-xAs injection lasers N80-33733
Single-mode laser studies: Design and performance of a fixed-wave length source and coupling of lasers to thin-film optical waveguides
[NASA-CR-3341] N80-33735

LASER OUTPUTS
Collimated beam manifold and method for using the same — laser beams
[NASA-CASE-MFS-25312-1] N80-34251
Analysis of unstable optical resonators
[AD-A088800] N80-34255

LASER PLASMA INTERACTIONS
Interaction of short wavelength laser radiation with spherical shell targets
[KMSF-U-953] N80-33741

LASER RANGE FINDERS
A linear photodiode array employed in a short range laser triangulation obstacle avoidance sensor — Martian roving vehicle sensor
[NASA-CR-163613] N80-33747

LASER SPECTROSCOPY
Laser excited nonresonant fluorescence spectroscopy
[ATR-80(7783)-1] N80-33523
Application of picosecond and light scattering spectroscopies to the study of energetic materials
[AD-A088904] N80-33596
Comparative performance of HgCdTe photodiodes for heterodyne application
[NASA-TP-1745] N80-33680
In situ ozone data for evaluation of the laser absorption spectrometer ozone remote sensor: 1979 southeastern Virginia urban plume study summer field program
[NASA-TM-81831] N80-33928
Atmospheric solar absorption measurements in the 9 to 11 mu m region using a diode laser heterodyne spectrometer
[NASA-TP-1726] N80-33998

LASER TARGETS
Interaction of short wavelength laser radiation with spherical shell targets
[KMSF-U-953] N80-33741

LASERS
Interaction of electrons and electromagnetic waves in periodic structures
[AD-A088739] N80-33662

LATE STARS
Spectra of late-type stars in the one to four micron region N80-34302

LATERAL STABILITY
Mode structure of Al sub xGa sub 1-xAs injection lasers N80-33733

LAUNCH WINDOWS
Launch mission summary: FLTSATCOM-D Atlas/Centaur-57
[NASA-TM-82213] N80-33452
Launch mission summary and terminal countdown, Delta 153 Satellite Business Systems satellite (SBS-A)
[NASA-TM-82212] N80-33455

LEAD ACID BATTERIES
Lead batteries. Citations from the NTIS data base
[PB80-813363] N80-33923
Lead batteries. Citations from the Engineering Index data base
[PB80-813371] N80-33924
Verification test of the change-of-pace station wagon
[AD-A089059] N80-34297
Verification test of the battronic mini van
[AD-A089058] N80-34298

LEAD ALLOYS
The reflowing of tin-lead deposits
[BLL-RTS-12262] N80-33533

LEADING EDGE SWEEP
Low-speed aerodynamic characteristics of a highly swept arrow wing configuration with several deflected leading edge concepts
[NASA-TM-80180] N80-33347

LEADING EDGES
Evaluation of laminar flow control system concepts for subsonic commercial transport aircraft
[NASA-CR-159253] N80-33394

LEAR JET AIRCRAFT
Development and analysis of the learjet 54/55 fuselage NASTRAN model using substructure techniques N80-33794

LEARNING
Learning algorithms for two person zero-sum stochastic games with incomplete information: A unified approach
[S/IS-79081] N80-34150

LEARNING THEORY
Application of a hierarchical structure stochastic learning automation
[S/IS-79061] N80-34151

LEAVES
A model of plant canopy polarization response
[E80-10336] N80-33835

LEG (ANATOMY)
Effect of antiorthostatic hypokinesia and space flight factors on change in leg volume N80-34072

LEGIBILITY
Reading handwritten words using hierarchical relaxation N80-34161

LENS DESIGN
Single chip lenses for ultrasonic imaging
[AD-A088857] N80-34220
Generalized ray tracing, generalized bending and use of caustic surfaces as merit functions in optical design N80-34247

LESIONS
Lesions to and recovery of mouse seminiferous epithelium after exposure to radiation at different dose rates N80-34079

LEUKOCYTES
Morphological changes in rat lungs after flight aboard the Cosmos-936 biosatellite N80-34066

LIBRARIES
Planning a DSN support section technical library N80-33436

LIFE (DURABILITY)
Time-temperature-stress capabilities of composite materials for advanced supersonic technology application, phase 1
[NASA-CR-159267] N80-33496
Employment of a digital computer in the tests to ascertain the useful life of the thruster RIT 10
[DFVLR-MITT-79-02] N80-34125

LIFE SCIENCES
Technology Assessment. Citations from the NTIS data base
[PB80-813165] N80-34299
Technology Assessment. Citations from the NTIS data base
[PB80-813173] N80-34300

LIFT
Application of identical aerodynamic functions N80-33372

LIGHT (VISIBLE RADIATION)
Spectral distributions 5: Visible spectra of standard and improved green flare compositions
[AD-A089055] N80-33597
Selective reflection of light at a solid-gas interface and its application N80-34244
Some aspects of the nonlinear interaction of light and matter N80-34257

LIGHT AMPLIFIERS
Analysis of unstable optical resonators
[AD-A088800] N80-34255

LIGHT MODULATION
Collimated beam manifold and method for using the same — laser beams
[NASA-CASE-MFS-25312-1] N80-34251

LIGHT SCATTERING
Application of picosecond and light scattering spectroscopies to the study of energetic materials
[AD-A088904] N80-33596

LIGHT TRANSMISSION
Turbid water measurements of remote sensing penetration depth at visible and near-infrared wavelength
[NASA-TM-81843] N80-33927

LINE SPECTRA
Continuous irradiation methods for nuclear resonance line-narrowing N80-34233
A study of the 10830 A line of neutral helium in the spectra of red giants N80-34303

Effective depth of spectral line formation in planetary atmospheres
[NASA-CR-163617] N80-34318
Extreme ultra-violet emission from coronal structures
[AD-A087803] N80-34329

LINEAR ARRAYS
A linear photodiode array employed in a short range laser triangulation obstacle avoidance sensor — Martian roving vehicle sensor
[NASA-CR-163613] N80-33747

LINEAR EQUATIONS
Non-quadratic nomography, chapter 2
[BLL-RTS-12290] N80-34166
Ordinary differential equations
[INPE-1753-RPE/144] N80-34184

LINEAR POLARIZATION
A model of plant canopy polarization response
[E80-10336] N80-33835

LINEAR PROGRAMMING
Forward linear programming N80-34143
Stochastic network with recourse N80-34158

LINEAR SYSTEMS
Low frequency sea level variability along the west coast of North America N80-34046
On the convergence of a block successive overrelaxation method for a class of linear complementarity problems
[AD-A088760] N80-34154
Errors in finite-difference computations on curvilinear coordinate systems
[NASA-CR-163601] N80-34178

LINEAR VIBRATION
Analysis of in-line flow-induced vibrations using linearization methods N80-33710

LINEARIZATION
A simple method for converting frequency domain aerodynamics to the time domain
[NASA-TM-81844] N80-33358
Linearised methods in supersonic flow N80-33380
Analysis of in-line flow-induced vibrations using linearization methods N80-33710
Parameter estimation in undetermined systems N80-34172

LIQUEFIED NATURAL GAS
Discussion on explosion hazards — conference proceedings, Goettingen, West Germany, 24 Aug. 1979
[MPIS-23/1979] N80-33582
Perspectives on research on LNG vapor cloud dispersion N80-33593
Vapor cloud explosion studies in the United States N80-33585

LIQUID FUELS
Oversight: Alternate liquid fuels technology
[GPO-50-313] N80-33580

LIQUID HELIUM
Superfluidity in 3He-4He mixture thin films N80-33609

LIQUID METALS
Power losses in liquid metal current collectors
[AD-A086527] N80-33684
Turbulent heat transfer to liquid metals in a circular pipe N80-33705

LIQUID ROCKET PROPELLANTS
Fluorinated desensitizing ingredients for propellants
[AD-A088704] N80-33598
Ultrasound level-meter for measuring propellant levels in Ariane tanks in its first and second stages N80-33615

LIQUID-SOLID INTERFACES
An investigation of the heat transfer at the liquid/solid interface of rapidly melting ice
[AD-A089099] N80-33722

LIQUID-VAPOR INTERFACES
Vapors-liquid phase separator — infrared telescope heat sink
[NASA-CR-163621] N80-33717

LITHIUM
Characterization of surface complexes on lithium N80-33546

LITHIUM FLUORIDES
Mechanisms of erosion
[AD-A088571] N80-33498

LOAD DISTRIBUTION (FORCES)
Finite circular plate on elastic foundation controlly loaded by rigid spherical indenter N80-33792

LOAD TESTS
Fatigue testing of vampire wings
[ARL/STRUC-REPT-378] N80-33399
On the design verification of large flexible solar arrays: First experiences gained N80-33897

LOADS (FORCES)
Introduction to the fundamentals of strain gauge practice
[NIAST-79/154] N80-33728
Analysis and synthesis of operational loads
[RAE-LIB-TRANS-2108(5207)] N80-33757
An analytical and experimental investigation of biaxial loading effects on cracks emanating from a circular hole N80-33762
The characterization of the crack growth behaviour of alloy IN-100 at elevated temperature under sustained load N80-33765
Effect of surface ellipticity on dynamically loaded spherical and cylindrical joints and bearings N80-33766
Multi-parameter yield zone for predicting spectrum crack growth
[NASA-TM-81890] N80-33778
A one-pass method for counting range mean pair cycle for fatigue analysis
[ARL-STRUC-NOTE-454] N80-33781
On the application of nonlinear load elements to thermal analyses using the NASTRAN thermal analyzer N80-33789

LOG PERIODIC ANTENNAS
Spatial pulse compression
[AD-A084750] N80-33663

LOGISTICS MANAGEMENT
Cargo Logistics Airlift Systems Study (CLASS). Volume 5: Summary
[NASA-CR-158951] N80-33382
Space shuttle solid rorket booster retrieval system: Five NOSC papers on space shuttle support
[AD-A089080] N80-33458

LONG TERM EFFECTS
Evaluation and prediction of long term space environmental effects on non-metallic materials
[NASA-CR-161585] N80-33479
Cardiorespiratory system reactions of cosmonauts to exercise following long-term missions aboard the Salyut 6 orbital station N80-34060

LONGITUDINAL STABILITY
Longitudinal stability and control in wind shear with energy height rate feedback
[NASA-TM-81829] N80-33416

LOSSES
Power losses in liquid metal current collectors
[AD-A086527] N80-33684

LOW ALTITUDE
Determination and maintenance of Earth orbits with arcs of minimum altitude variation N80-33447
Icing characteristics of low altitude, supercooled layer clouds, revision
[AD-A088892] N80-34036

LOW PRESSURE
Homogeneous vapor phase nucleation of large polar molecules under Limiting experimental conditions: High temperatures, low pressures, and long growth times — cloud chamber studies N80-34224

LOW TEMPERATURE
Research on low temperature, directed energy processing of very large scale integrated structures
[AD-A088562] N80-33621
Characterization of three types of silicon solar cells for SEPS Deep Space Mission. Volume 3: Current-voltage characteristics of spectrolab sculptured BSR/P+ (K7), BSR/P+ (K8.5) and BSR (K4.5) cells as a function of temperature and intensity
[NASA-TM-78305] N80-33863

LOW TEMPERATURE ENVIRONMENTS
The behavior of the military battery type BB248/U used to start the engine of the A.P.C.
[AD-A080615] N80-33905

LOW TEMPERATURE TESTS
Study of the internal mechanics of space photovoltaic generators N80-33878
Evaluation of cranking characteristics of commercially available batteries between room temperature and -40 C
[AD-A080614] N80-33906

LOW VISIBILITY
Aids for improving vision in white-out
[AD-A088726] N80-34094

LOWER ATMOSPHERE
Measurements of secondary cosmic radiation aboard a jet aircraft at altitudes of 12 and 12.5 km over Boa Vista and Campinas
[INPE-1808-RPE/176] N80-34337

LOWER BODY NEGATIVE PRESSURE
Reactions to LBNP test of the crew of the Salyut 5 orbital station N80-34091

LUBRICATION
Effect of cage design on characteristics of high-speed-jet-lubricated 35-millimeter-bore ball bearing — turbojet engines
[NASA-TP-1732] N80-33749

LUMINOUS INTENSITY
Comment on Airglow observations of the OI 7774 A multiplet at Arecibo during a magnetic storm by Roger G. Burnside, John W. Meriwether and James C. G. Walker
[INPE-1843-RPE/203] N80-33994
Photometry and colorimetry of retroreflection: State-of-measurement-accuracy report
[PB80-201783] N80-34256

LUNAR CRATERS
Geologic implications of regional scale variation in lunar crater shape. Fourier crater shape analysis N80-34312

LUNAR EVOLUTION
Saturn: Origin and composition of its inner moons and rings
[NASA-CR-163630] N80-34320

LUNAR LUMINESCENCE
Correction, correlation, and theoretical consideration of lunar X-ray fluorescence intensity ratios N80-34315

LUNAR ORBITS
Two problems pertaining to the dynamics of the origin of the Moon, and its subsequent orbital evolution N80-34310

LUNAR PHOTOGRAPHY
Correction, correlation, and theoretical consideration of lunar X-ray fluorescence intensity ratios N80-34315

LUNAR ROCKS
Comparative petrology of the Apollo 11 mare basalt, part 1. The oxygen isotope geochemistry of the Abitibi greenstone belt, part 2 N80-34313
Cosmic-ray produced radionuclides in extraterrestrial material — lunar samples, meteorites, and iron spherules in Pacific clay N80-34332

LUNAR TIDES
Two problems pertaining to the dynamics of the origin of the Moon, and its subsequent orbital evolution N80-34310

LUNG MORPHOLOGY
Human lung ventilation, mechanics and morphology N80-34085

LUNGS
Lung deposition of aerosols from industrial environments N80-33933
Morphological changes in rat lungs after flight aboard the Cosmos-936 biosatellite N80-34088
Human lung ventilation, mechanics and morphology N80-34085

LYMAN ALPHA RADIATION
Computer assisted performance tests of the Lyman Alpha Coronagraph
[NASA-CR-163622] N80-33462

M

MACH CONES
A comprehensive investigation into the supersonic viscous flow about a slender cone at high angle of attack: Experimental and theoretical results N80-33344

MACHINE TOOLS
Programming alternatives for NC machines tools
[TSD-T-79108] N80-34163

MACHINING
Magnetic-abrasive machining
[BLL-RTS-12400] N80-33742

MAGNESIUM OXIDES
Mechanisms of erosion
[AD-A088571] N80-33498

MAGNET COILS
Two tests of electric fields, second-order in source-velocity terms of closed steady currents. 1: An electron beam. 2: A superconducting coil N80-33674

MAGNETIC ANOMALIES
Investigations of medium wavelength magnetic anomalies in the eastern Pacific using Magsat data
[E80-10334] N80-33833
MAGNETIC DISKS
Satnet development and operation. Pluribus satellite IMP development. Remote site maintenance. Internet development. Mobile Access Terminal Network, TCP for the HP 3000, TCP - TAC
[AD-A089025] N80-33458
MAGNETIC DISTURBANCES
Solar-terrestrial predictions proceedings. Volume 4: Prediction of terrestrial effects of solar activity
[PB80-200025] N80-34011
MAGNETIC EFFECTS
Superconductivity, magnetism and structural study of some new ternary transition metal borides
N80-33675
MAGNETIC FIELDS
Magnetic-abrasive machining
[BLL-RTS-12400] N80-33742
Investigations of medium wavelength magnetic anomalies in the eastern Pacific using Magsat data
[E80-10334] N80-33833
Analysis of changes in evoked bioelectrical activity of the brain during exposure to high-intensity stationary magnetic field N80-34082
Excitation of spin waves at magnetic domain walls
N80-34213
Experimental investigation of modulational effects in a magnetized plasma N80-34259
Mass loss from warm giants: Magnetic effects
[NASA-CR-163602] N80-34322
MAGNETIC PROPERTIES
Origin of magnetic properties in amorphous metals
[AD-A089145] N80-33580
MAGNETIC PUMPING
Coronal heating by stochastic magnetic pumping
[NASA-CR-163637] N80-34330
MAGNETIC SIGNATURES
Investigations of medium wavelength magnetic anomalies in the eastern Pacific using Magsat data
[E80-10334] N80-33833
MAGNETIC STORMS
Comment on Airglow observations of the OI 7774 A multiplet at Arecibo during a magnetic storm by Roger G. Burnside, John W. Meriwether and James C. G. Walker
[INPE-1843-RPE/203] N80-33994
MAGNETIC SURVEYS
A multi-site magnetotelluric measurement system with real time data analysis N80-33988
MAGNETOHYDRODYNAMIC STABILITY
Radar observations of the equatorial electrojet irregularities and theory of type 1 turbulence
N80-33990
Two examples of the decay instability in an inhomogeneous plasma N80-34258
MAGNETOSPHERE
IMP-8. Volume 2: Scientific section — Bibliography
[NASA-CR-160024] N80-33451
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 1: Optical auroral images and related direct measurements
[NASA-TM-81121] N80-33897
Atmospheric/ionospheric/magnetospheric
h using the Chatanika radar
[AD-A088915] N80-34004
The Jovian magnetosphere N80-34316
MAGNETRONS
Microwave tubes
[AD-A088745] N80-33688
MAGNONS
Excitation of spin waves at magnetic domain walls
N80-34213
MAINTAINABILITY
Analysis of Markov renewal processes with some nonregeneration points and their applications to reliability theory N80-33753
MAINTENANCE
Battery electrolytes. Citations from the NTIS data base
[PB80-808629] N80-33915
Battery electrolytes. Citations from the Engineering Index data base
[PB80-808637] N80-33916
MAN MACHINE SYSTEMS
Effects of criteria on flight simulation study 1: Heading deviation tolerance
[AD-A088908] N80-33423
Users manual for the transparent touch sensitive cathode ray tube display overlay
[AD-A088609] N80-33891
Climatological relationships of severe duststorms in the Great Plains to synoptic weather patterns: A potential for predictability
[NASA-CR-163626] N80-34022
Contributions to the symposium: Computer Science in Space Flight — conference proceedings, Oberpfaffenhofen, West Germany, 19 Jan. 1978
[ESA-TT-587] N80-34112
Description of a system for the interactive processing of the image data of a geostationary weather satellite
[DFVLR-MITT-78-02] N80-34116
MANAGEMENT INFORMATION SYSTEMS
The use of PROINF in the research project EBOSIPES — project information system
[DFVLR-MITT-78-02] N80-34124
MANAGEMENT METHODS
Database design: Choice of a methodology
[CSIR-TWISK-102] N80-34286
MANAGEMENT PLANNING
Energy conservation and management study of aircraft hangars at selected Air Force Bases
[AD-A089075] N80-33420
Passenger comfort technology for system decision making
[NASA-TM-81875] N80-34096
Management guidance for research climate
N80-34280
MANIFOLDS
Collimated beam manifold and method for using the same — laser beams
[NASA-CASE-MFS-25312-1] N80-34251
MANIPULATORS
The use of computer-controlled manipulators in underwater technology
[DFVLR-MITT-78-02] N80-34117
MANNED SPACE FLIGHT
Extravehicular Crewman Work System (ECWS) study program. Volume 2: Construction
[NASA-CR-163698] N80-34102
MANUALS
Pulse codes for the transmission of binary data
[BLL-TRANS-3784] N80-33637
MANUFACTURING
TNT equivalency testing of chemical mixtures in continuous TNT manufacturing
[AD-A088903] N80-33600
State and trends in development of the manufacture of printed circuits
[BLL-RTS-12266] N80-33672
MANY BODY PROBLEM
Power series expansion for a crossing-symmetric vertex function — the Green's function formulation of the many-body theory
[CSIR-TWISK-134] N80-34182
MAPPING
A multi-step method for avalanche zone recognition and analysis — San Juan Mountains (co)
N80-33624
Bonne's projection of Meteosat images — subroutines
[CSIR-SR-FIS-201] N80-33837
MARINE ENVIRONMENTS
Properties of the oceans reflected in the sea-bed distribution of quaternary planktonic Foraminifera: Including a study of the limits of empirical Paleo-Oceanographic models and the recognition and interpretation of faunal assemblages lacking modern counterparts N80-34047
MARINE METEOROLOGY
Experiments concerning catagorical forecasts of open-ocean visibility using model output statistics
[AD-A088790] N80-34035
MARINER 9 SPACE PROBE
Spectroscopy of the Mars airglow from Mariner 9 ultraviolet spectrometer data N80-34317
MARKET RESEARCH
Cargo Logistics Airlift Systems Study (CLASS). Volume 5: Summary
[NASA-CR-158951] N80-33382
Private sector involvement in civil space remote sensing. Volume 1: Report
[NASA-TM-82206] N80-33845
Private sector involvement in civil space remote sensing. Volume 2: Appendices
[NASA-TM-82207] N80-33846
MARKETING
Passenger comfort technology for system decision making
[NASA-TM-81875] N80-34096
MARKOV CHAINS
The application of generalized group inverse to discrete finite Markov chains N80-34195
Generalized inverses and their application to applied probability problems — Markov chains
[AD-A089069] N80-34207
MARKOV PROCESSES
Analysis of Markov renewal processes with some nonregeneration points and their applications to reliability theory N80-33753
Generalized inverses and their application to applied probability problems — Markov chains
[AD-A089069] N80-34207
MARS ATMOSPHERE
Spectroscopy of the Mars airglow from Mariner 9 ultraviolet spectrometer data N80-34317
MARS SURFACE
A linear photodiode array employed in a short range laser triangulation obstacle avoidance sensor — Martian roving vehicle sensor
[NASA-CR-163613] N80-33747
Orographic effects in the atmospheres of other planets — Viking Mars observations N80-33822
Carbonate formation on Mars — environment simulation N80-34314
MASS FLOW
Analytical and numerical solutions for mass diffusion in a composite cylindrical body N80-33698
MASS FLOW RATE
Flows in the annular region when an underexpanded nozzle is exhausted into a stepped launch tube
[AD-A086581] N80-33477
MASS SPECTRA
The self-training interpretive and retrieval system: Improved substructure perception N80-33509
Computer prediction of molecular weights from unknown mass spectra N80-33517
MASS SPECTROMETERS
Instrumentation development for LASSII equatorial measurements
[AD-A088880] N80-34002
Construction and testing of an ion photofragment momentum spectrometer
[AD-A088753] N80-34238
MASS SPECTROSCOPY
Aspects of ionization and sputtering in the glow discharge by solids mass spectrometry N80-33508
MASS TRANSFER
Modeling of heat and mass transfer during coal block gasification N80-33577
Droplet evaporation in high temperature environments N80-33696
The Transfer of Pollutants in Two Southern Hemispheric Oceanic Systems
[REPT-39] N80-33961
MATERIALS RECOVERY
Regenerations of critical process solutions relative to recoveries of valuable substances
[BLL-RTS-12141] N80-33505
Ion flotation studies and separation procedures for the platinum group metals N80-33545
Lead batteries. Citations from the NTIS data base
[PB80-813363] N80-33923
Lead batteries. Citations from the Engineering Index data base
[PB80-813371] N80-33924
MATHEMATICAL MODELS
The problem of wind tunnel flow nonuniformity in free-model aircraft dynamic stability
[CSIR-NIAST-79-60] N80-33352
Analytical methods for prediction of unsteady turbulent boundary layers N80-33377
Sea King Mk. 50 helicopter sonar dynamics study. A simplified control systems mathematical model
[AR-001-607] N80-33395
Validation of the operating and support cost model for avionics automatic test equipment (OSCATE)
[AD-A088725] N80-33419
Determination and maintenance of Earth orbits with arcs of minimum altitude variation N80-33447
Characterization of surface complexes on lithium
N80-33546

Vinyl acetate emulsion polymerization kinetics and mechanism N80-33567
Description of research related to vapor cloud explosions in the Netherlands N80-33591
Perspectives on research on LNG vapor cloud dispersion N80-33593
Evaluation of the effects of detonation in a spherical bomb N80-33594
Coal gasification combined-cycle system analysis [EPRI-AP-1390] N80-33601
Material characterization for studing flexible pavement behavior in fatigue and permanent deformation N80-33611
A parametric analysis of performance characteristics of satellite-borne multiple-beam antennas [NASA-CR-163632] N80-33641
Frequency skipping in negative resistance oscillators with applications to crystal-controlled monolithic phase-locked loops N80-33677
Power losses in liquid metal current collectors [AD-A086527] N80-33684
Study of laminar and turbulent flow in ducts of polar cross-section N80-33699
Laminar film flow phenomena-theory and application to the two-phase closed thermosyphon N80-33703
Mathematical modelling of two-phase flow oscillations N80-33707
An air-vapor-droplet local interaction model for spray units N80-33708
An investigation of the heat transfer at the liquid/solid interface of rapidly melting ice [AD-A089099] N80-33722
A watershed information system N80-33825
Development of a soil moisture model for use with passive microwave remote sensors N80-33828
Evaluation of hydropower potential in a river basin — Prediction analysis technique N80-33856
Solar cell modeling for computer-aided generator design and irradiation degradation computations N80-33896
International Conference on Air pollution, volume 4 N80-33954
Possibilities and limitations of different types of dispersion models with respect to air quality management N80-33959
A three dimensional finite difference model of the transport of suspended sediment [CSIR-RR-359] N80-33962
Dynamic transport of inert tracers by growing baroclinic and stationary planetary waves in the lower stratosphere of the Northern Hemisphere in winter N80-33986
A numerical simulation of the influence of heat and moisture fluxes upon mesoscale circulations N80-34015
Tropical cyclone genesis: Numerical modeling inferences N80-34016
Algorithm for extracting data from meteorological satellites for use in estimating precipitation [INPE-1769-RPE/155] N80-34026
A two-dimensional diabatic isopycnal model of a coastal upwelling front N80-34043
A model of wind-forced viscous circulation near coastal boundaries N80-34044
Determining the three-dimensional motion and model of objects from a sequence of images N80-34136
A comprehensive model for human motion simulations and its application to the take-off phase of the long jump [CSIR-TWISK-131] N80-34147
Topics in model completeness of direct powers and direct products of theories N80-34169
Rejection of a single outlier in a factorial design [CSIR-TWISK-117] N80-34179
Consistency, redundancy and extension in fuzzy systems for regressive decision [INPE-1850-RPE/207] N80-34210
Energy transfer in ionic and molecular systems N80-34222

MATRICES (MATHEMATICS)
Improvements in sparse matrix operations of NASTRAN N80-33784
Solution of enforced boundary motion in direct transient and harmonic problems N80-33788
The size of numbers in the analysis of certain algorithms N80-34142
The application of generalized group inverse to discrete finite Markov chains N80-34195
Strict chebyshev approximation of discrete data [CSIR-TWISK-133] N80-34201
On reversible transformations of space elements [AD-A080447] N80-34202
The stability of planar dynamical systems linear-in-cones [CSIR-TWISK-137] N80-34212

MATTER (PHYSICS)
On the microwave interaction with matter and microwave breakdown of air [AD-A088936] N80-33656
Some aspects of the nonlinear interaction of light and matter N80-34248
Some aspects of the nonlinear interaction of light and matter N80-34257

MEAN
A one-pass method for counting range mean pair cycle for fatigue analysis [ARL-STRUC-NOTE-454] N80-33781
Great Lakes degree-day and temperature summaries and norms, 1897 - 1977 [PB80-195977] N80-34040

MEASURING INSTRUMENTS
Pressure and flow measurement — flight testing [AGARD-AG-160-VOL-11] N80-33407
Computer assisted performance tests of the Lyman Alpha Coronagraph [NASA-CR-163622] N80-33462
La Recherche Aerospatiale, Bi-monthly Bulletin no. 1980-1 [ESA-TT-651] N80-33613
An electrical method of measuring strain and damage N80-33620

MECHANICAL ENGINEERING
Special engineering services to establish inspection criteria for bearings to improve life prediction [AD-A088765] N80-33754

MECHANICAL PROPERTIES
Evaluation and prediction of long term space environmental effects on non-metallic materials [NASA-CR-161585] N80-33479
Time-temperature-stress capabilities of composite materials for advanced supersonic technology application, phase 1 [NASA-CR-159267] N80-33496
Control of solidification structures and properties of industrial Al-Si alloys [BLL-RTS-11916] N80-33544
Study of the internal mechanics of space photovoltaic generators N80-33878

MECHANICAL SHOCK
The Shock and Vibration Digest, volume 12, number 8 [AD-A088658] N80-33758

MECHANIZATION
Automation literature: A brief review and analysis [NASA-TM-81245] N80-34097

MEDICAL SCIENCE
Technology Assessment. Citations from the NTIS data base [PB80-813165] N80-34299
Technology Assessment. Citations from the NTIS data base [PB80-813173] N80-34300

MELTING
An investigation of the heat transfer at the liquid/solid interface of rapidly melting ice [AD-A089099] N80-33722

MELTING POINTS
Great Lakes degree-day and temperature summaries and norms, 1897 - 1977 [PB80-195977] N80-34040

MEMBRANES
The twisting and stretching of a nonlinear annulus including the effect of wrinkling N80-33764

MEMORY
Effects of transmeridional flights and highland conditions on different forms of memory N80-34068

MERCATOR PROJECTION
Improved algorithm for calculation of UTM and geodetic coordinates — Jacobi elliptic functions [NOAA-S/T-80-281] N80-33836

MERCURY (PLANET)
Planetary radar N80-33445

MERCURY VAPOR
In situ doping of thin Ca (x)Hg (1-x)Te films obtained by cathode sputtering in mercury vapour. Application to the production of infrared detectors [BLL-RTS-11980] N80-33528

MESAS
Changes in the potential for wind energy generation due to terrain modification of the boundary-layer flow N80-34020

MESOMETEOROLOGY
A numerical simulation of the influence of heat and moisture fluxes upon mesoscale circulations N80-34015

MESOSCALE PHENOMENA
Orographic effects revealed by satellite pictures: Mesoscale flow phenomena N80-33820

MESOSPHERE
The detection of atmospheric gravity waves by means of the wave interaction experiment N80-33980

MESSAGE PROCESSING
Development of an automatic system for plotting synoptic charts [INPE-1786-RPE/158] N80-34025

METABOLISM
Effect of task variable interactions in lifting and lowering N80-34090

METAL COATINGS
The reflowing of tin-lead deposits [BLL-RTS-12262] N80-33530
Investigations into the distribution of the layer thickness produced by barrel electroplating in the case of cyanic silver plating [BLL-RTS-12204] N80-33538

METAL CUTTING
Reasons for the occurrence of smooth work surfaces in metal cutting [BLL-RTS-12078] N80-33743

METAL FATIGUE
Some formulas for the crack opening stress level [M-368] N80-33780

METAL FOILS
Collective acceleration of ions in vacuum N80-34230

METAL IONS
Electroplating: Metal deposits by electrolysis, throwing power [BLL-RTS-11870] N80-33527
Ion flotation studies and separation procedures for the platinum group metals N80-33545

METAL MATRIX COMPOSITES
The yielding behavior of unidirectional metal-matrix composites N80-33551

METAL OXIDE SEMICONDUCTORS
Study of high field effects in metal-aluminum oxide-silicon capacitors N80-33676

METAL OXIDES
Surface oxide softening in tungsten N80-33549
Fixation of Zn(ii) ions on metal oxide surfaces [BLL-RTS-12200] N80-34282

METAL PLATES
Non-specular ultrasonic bounded beam transmission through solid plates N80-34214

METAL POLISHING
Bright dipping solution for iron-nickel-cobalt alloys [BLL-RTS-12198] N80-33529

METAL SHEETS
A crack opening displacement approach to crack patching [ARL/STRUC-NOTE-455] N80-33797

METAL SURFACES
Effects of flank protection media in the etching of copper — thioureas [BLL-RTS-12359] N80-33539
Metal surface damage due to cavitation erosion [BLL-RTS-12269] N80-33543
The passivity of nickel-effects of applied potential, solution pH and environmental temperature N80-33553

METALLIC GLASSES
Application of solidification theory to rapid solification processing [AD-A089006] N80-33480

METALLIC STARS
Two astrophysical problems in late-type peculiar stars: Calcium in super-metal-rich stars; and carbon nitrogen and oxygen in weak G-band stars N80-34311

METALLIZING
The influence on the front metal coverage factor on the open-circuit voltage of silicon solar cells N80-33892

METALLOGRAPHY
Control of solidification structures and properties of industrial Al-Si alloys
[BLL-RTS-11916] N80-33544
The ONERA vacuum ultraviolet spectrograph and its use for the study of surface layers in titanium and its alloys N80-33617

METASTABLE ATOMS
Molecular beam chemiluminescent investigation of the inelastic collisions of rare gas metastable atoms N80-34223

METASTABLE STATE
Ion-beam-induced modifications of thin film structures and formation of metastable phases N80-34265

METEORITIC COMPOSITION
Cosmic-ray produced radionuclides in extraterrestrial material — lunar samples, meteorites, and iron spherules in Pacific clay N80-34332

METEOROLOGICAL CHARTS
Development of an automatic system for plotting synoptic charts
[INPE-1798-RPE/156] N80-34025

METEOROLOGICAL PARAMETERS
Medium-scale study of a waving cold front
[BLL-TRANS-1453-(9022.549)] N80-34013
A study of ice nucleus concentrations in eastern New York State N80-34017
Atmospheric variability and air-sea interaction N80-34023
Aerosol modelling for optical weather
[AD-A088583] N80-34034

METEOROLOGICAL RADAR
Structure, mechanism and prediction of orographically enhanced rain in Britain N80-33814

METEOROLOGICAL SATELLITES
The United States space observation policy
[NASA-TM-76373] N80-33425
Data collection platforms: A technique for space telemetry applied to surveying ambient parameters
[INPE-1743-RPE/139] N80-33459

METEOROLOGY
The United States space observation policy
[NASA-TM-76373] N80-33425
The perturbation of some atmospheric mechanisms by emissions from aircraft
[AD-A089100] N80-33965
Determination of atmospheric water vapor from dewpoint measurement
[PB80-197189] N80-34039

METEOSAT SATELLITE
Bonne's projection of Meteosat images — subroutines
[CSIR-SR-FIS-301] N80-33837
Description of a system for the interactive processing of the image data of a geostationary weather satellite
[DFVLR-MITT-79-02] N80-34116

METHOXY SYSTEMS
Source emission measurements of volatile organic chemicals
[PB80-198518] N80-33974

METHYL ALCOHOLS
Preparation and stability of emulsions of methanol in automobile diesel oil
[CSIR-CENG-294] N80-33579

MICROANALYSIS
Development of a scanning electron microscope based microanalytical system N80-32512

MICROBIOLOGY
Polyfungin, a new antifungal antibiotic. 4: The use of thin layer chromatography for determining the qualitative composition of the polyfungin complex
[BLL-RTS-12381] N80-34054
Theoretical and applied aspects of the anabiosis of microorganisms
[BLL-RTS-12350] N80-34055

MICROCOMPUTERS
Microcomputers: Telecommunication applications. Citations from the NTIS data base
[PB80-812688] N80-34126
Microcomputers: Telecommunication applications. Citations from the Engineering Index data base
[PB80-812696] N80-34127
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812597] N80-34128
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812905] N80-34129
Microcomputers: Design and software development. Citations from the NTIS data base
[PB80-812613] N80-34130
Microcomputers: Design and software development. Citations from the NTIS data base
[PB80-812621] N80-34131
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812639] N80-34132
Microcomputers: Basic design and development. Citations from the NTIS data base
[PB80-812654] N80-34133

MICROELECTRONICS
World progress in electronic switching. Part 2: Analysis of current trends — in microelectronics for data transmission
[BLL-TRANS-3798-(7737.470)] N80-33670

MICROMETEOROIDS
Cosmic-ray produced radionuclides in extraterrestrial material — lunar samples, meteorites, and iron spherules in Pacific clay N80-34332

MICROPROCESSORS
Digital flight control research using microprocessor technology
[AD-A089147] N80-33417
High speed lookup table approach to radiometric calibration of multispectral image data
[NASA-TP-1741] N80-33483
Intercommunications in real time, redundant, distributed computer system
[NASA-CR-163604] N80-33642
Research in geronomy
[NASA-CR-163610] N80-33666
Building block modeling methodology for composition of microprocessor-based digital systems N80-34109
Problems of autonomous airborne satellite control systems
[DFVLR-MITT-79-02] N80-34119
Microcomputers: Telecommunication applications. Citations from the NTIS data base
[PB80-812688] N80-34126
Microcomputers: Telecommunication applications. Citations from the Engineering Index data base
[PB80-812696] N80-34127
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812597] N80-34128
Microcomputers: Design and software development. Citations from the NTIS data base
[PB80-812613] N80-34130
Microcomputers: Design and software development. Citations from the NTIS data base
[PB80-812621] N80-34131
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812639] N80-34132
Microcomputers: Basic design and development. Citations from the NTIS data base
[PB80-812654] N80-34133
Multiple Microprocessor System (MMS) design study, volume 2
[AD-A086066] N80-34160

MICROSCOPY
Research in general physics, plasma dynamics, and communication sciences and engineering
[RLE-PR-122] N80-34338

MICROSTRUCTURE
Directional solidification of nonoxide eutectics
[AD-A089585] N80-33557

MICROWAVE CIRCUITS
Filter project with a planar circuit in the waveguide
[INPE-1817-RPE/185] N80-33680

MICROWAVE FILTERS
Computer-aided analysis for the design of broad classes of microwave couplers, filters, and transmission lines
[AD-A089772] N80-33687

MICROWAVE LANDING SYSTEMS
Test and evaluation of Texas instruments small community microwave landing system
[AD A089852] N80-33387
Precision I-band DME tests
[AD-A089053] N80-33388

MICROWAVE TRANSMISSION
Tropospheric scatter communications. Citations from the NTIS data base
[PB80-812571] N80-33386

MICROWAVE TUBES
Research study on near millimeter wave orotrons
[AD-A089097] N80-33692

MICROWAVES
On the microwave interaction with matter and microwave breakdown of air
[AD-A089936] N80-33656
Satellite power systems: Status and planned activities N80-33904
Experimental investigation of modulational effects in a magnetized plasma N80-34259

MILITARY HELICOPTERS
Validation of the rotorcraft flight simulation program (C81) using operational loads survey flight test data
[AD-A089008] N80-33422

MILITARY OPERATIONS
A method of measuring the visibility of military objects
[RAE-LIB-TRANS-1961(5207)] N80-34242

MILKY WAY GALAXY
A deep near-infrared objective-prism survey for carbon stars toward the galactic center and anticenter N80-34305

MILLIMETER WAVES
Evaluation of specialized photoacoustic absorption chambers for Near Millimeter Wave (NMMW) propagation measurements
[AD-A088842] N80-33654
Research study on near millimeter wave orotrons
[AD-A089097] N80-33692
High power millimeter wave amplifier
[AD-A088591] N80-33695

MINERAL DEPOSITS
Uranium resources: A review of estimation methodologies
[PB80-193725] N80-33920
Origin and occurrence of selected world wide calcrete deposits N80-33984

MINERAL EXPLORATION
A multi-site magnetotelluric measurement system with real time data analysis N80-33988

MINERAL METABOLISM
Comparative study of effects of weightlessness and artificial gravity on density, ash, calcium and phosphorous content of calcified tissues N80-34064

MINERALOGY
Origin and occurrence of selected world wide calcrete deposits N80-33984

MINES (EXCAVATIONS)
Health requirements for advanced coal extraction systems
[NASA-CR-163265] N80-34093

MINICOMPUTERS
Microcomputers: Telecommunication applications. Citations from the NTIS data base
[PB80-812688] N80-34126
Microcomputers: Telecommunication applications. Citations from the Engineering Index data base
[PB80-812696] N80-34127
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812597] N80-34128
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812905] N80-34129
Microcomputers: Design and software development. Citations from the NTIS data base
[PB80-812613] N80-34130
Microcomputers: Design and software development. Citations from the NTIS data base
[PB80-812621] N80-34131
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812639] N80-34132
Multiple Microprocessor System (MMS) design study, volume 2
[AD-A086066] N80-34160
Sun Series program for the REEDA System — predicting orbital lifetime using sunspot values
[NASA-CR-161579] N80-34327

MINIMUM VARIANCE ORBIT DETERMINATION
Operational data handling: An essential need for the accurate determination of satellite orbits
[DFVLR-MITT-79-02] N80-34118

MISSION PLANNING
Evaluation of laminar flow control system concepts for subsonic commercial transport aircraft
[NASA-CR-159253] N80-33394

Mission operation report: Voyager program Voyager 1 encounter at Saturn November 12, 1980
[NASA-TM-82217] N80-33426

MISSOURI
Gravity geophysical dilineation of buried channel aquifers in the dissected till plains of northern Missouri
[PB80-194343] N80-33651

MIXING LENGTH FLOW THEORY
Theoretical studies of solar oscillations
[NASA-CR-163611] N80-34326

MODULATION
An investigation of continuous phase frequency shift keying as a modulation on additive impulsive atmospheric noise channels N80-33630

MOISTURE CONTENT
Influence of quality control variables on failure of graphite/epoxy under extreme moisture conditions
[NASA-TM-81246] N80-33492
Development of a soil moisture model for use with passive microwave remote sensors N80-33628
The use of radiation temperature to detect water-stress in sugarcane crop — Brazil
[INPE-1767-TDL/026] N80-33639
A study of ice nucleus concentrations in eastern New York State N80-34017
Determination of atmospheric water vapor from dewpoint measurement
[PB80-197189] N80-34039

MOLDS
Control of solidification structures and properties of industrial Al-Si alloys
[BLL-RTS-11916] N80-33544

MOLECULAR BEAMS
Molecular beam chemiluminescent investigation of the inelastic collisions of rare gas metastable atoms N80-34223
Low energy atomic collisions
[AD-A088748] N80-34234

MOLECULAR COLLISIONS
A study of the processes in the RF hydrogen gas dissociator N80-33438
Theoretical study of state-to-state collisions
[AD-A088746] N80-34270

MOLECULAR DIFFUSION
Experimental investigations of the transport properties of flow suspensions. 1: Measurement of velocity distributions of suspension flows in a rectangular channel. 2: Experimental study of the effective thermal conductivity in shear flow of a suspension. 3: The use of fluorescence correlation spectroscopy to measure molecular diffusion and velocity distributions N80-33711

MOLECULAR ELECTRONICS
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/1] N80-33914

MOLECULAR EXCITATION
Assigning reactive excited states in inorganic photochemistry
[AD-A088566] N80-33521

MOLECULAR INTERACTIONS
High temperature gas energy transfer
[AD-A089129] N80-34235

MOLECULAR RELAXATION
Energy transfer in ionic and molecular systems N80-34222

MOLECULAR STRUCTURE
Construction and testing of an ion photofragment momentum spectrometer
[AD-A088753] N80-34238
Theoretical study of state-to-state collisions
[AD-A088746] N80-34270

MOLECULAR WEIGHT
Computer prediction of molecular weights from unknown mass spectra N80-33517

MOLECULES
Homogeneous vapor phase nucleation of large polar molecules under Limiting experimental conditions: High temperatures, low pressures, and long growth times — cloud chamber studies N80-34224
Localized atomic orbitals for atoms in molecules N80-34225

MOMENTUM
Mechanisms responsible for topographical changes in PLT stainless steel and graphite limiters
[PPPL-1671] N80-33564

MOMENTUM TRANSFER
Finite element modeling of the coupled thermal and momentum diffusion equations
[AD-A089668] N80-34277

MONITORS
In-flight characteristics of the topside ionospheric monitor (SSIE) on the DMSP satellite flight 2 and flight 4
[AD-A088879] N80-34005

MONTE CARLO METHOD
The application of generalized group inverse to discrete finite Markov chains N80-34195
How near is a near-optimal solution: Confidence limits for the global optimum
[AD-A089108] N80-34203

MOON
Two problems pertaining to the dynamics of the origin of the Moon, and its subsequent orbital evolution N80-34310

MORPHOLOGY
Relativistic electron precipitation: An observational study N80-33827
Morphological study of rat kidneys after flight aboard the Cosmos-936 biosatellite N80-34065
Histostructural correlations in the hypothalamus-hypophysis-kidneys system under hypokinetic conditions N80-34075

MOTION PERCEPTION
Pilot/vehicle model analysis of visual and motion cue requirements in flight simulation — helicopter hovering
[NASA-CR-3312] N80-33396

MOTION PICTURES
A film of large scale field experiments on ethylene hazards N80-33589

MOUNTAINS
Influence of orography on the atmospheric general circulation N80-33812
Modification of the boundary layer by orography N80-33816
Measurements of boundary layer flow over a forested mountain slope N80-34018

MULTIPLE ACCESS
Use of the operating system OS-MVS in the technical and scientific field
[DFVLR-MITT-78-02] N80-34121

MULTIPLE BEAM INTERVAL SCANNERS
A parametric analysis of performance characteristics of satellite-borne multiple-beam antennas
[NASA-CR-163632] N80-33641

MULTIPLEXING
Tropospheric scatter communications. Citations from the NTIS data base
[PB80-812571] N80-33386
Intrinsic sources of IM generation
[AD-A089771] N80-33658

MULTIPROCESSING (COMPUTERS)
Satnet development and operation. Pluribus satellite IMP development. Remote site maintenance. Internet development. Mobile Access Terminal Network, TCP for the HP 3000, TCP - TAC
[AD-A089025] N80-33456

MULTIPROGRAMMING
Use of the operating system OS-MVS in the technical and scientific field
[DFVLR-MITT-78-02] N80-34121

MULTISPECTRAL PHOTOGRAPHY
High speed lookup table approach to radiometric calibration of multispectral image data
[NASA-TP-1741] N80-33483
A quantitative evaluation of LANDSAT for monitoring suspended sediments in a fluvial channel N80-33823
A multispectral data simulation technique
[E80-10311] N80-33830
A method for edge detection in images of natural resources
[INPE-1788-RPE/154] N80-33840

MULTIVARIATE STATISTICAL ANALYSIS
Low frequency sea level variability along the west coast of North America N80-34046
Interval estimation, ranking and selection procedures N80-34197
A descriptive approach to multiple-criteria decision making
[CSIR-TWISK-129] N80-34281

MUONS
A precise measurement of the sidereal anisotropy of cosmic rays near 1500 GV N80-34336

MUSCULOSKELETAL SYSTEM
A comprehensive model for human motion simulations and its application to the take-off phase of the long jump
[CSIR-TWISK-131] N80-34147

N

NASA PROGRAMS
Analysis of general aviation single-pilot IFR incident data obtained from the NASA aviation safety reporting system
[NASA-TM-80206] N80-33384
Experimental and analytical studies for the NASA carbon fiber risk assessment
[NASA-CR-159214] N80-33490
NASA patent abstracts bibliography. A continuing bibliography with indexes, supplement 17, section 2, July 1980
[NASA-SP-7039(17)-SECTION-2] N80-34284
Operational remote sensing legislation, part 1
[GPO-45-048] N80-34294
Operational remote sensing legislation, part 2
[GPO-52-581] N80-34295
A bibliography of planetary geology principal investigators and their associates, 1979 - 1980
[NASA-TM-82180] N80-34301

NASTRAN
Ninth NASTRAN Users' Colloquium
[NASA-CP-2151] N80-33782
New capacities and modifications for NASTRAN level 17.5 at DTNSRDC N80-33783
Improvements in sparse matrix operations of NASTRAN N80-33784
Solution sensitivity and accuracy study of NASTRAN for large dynamic problems involving structural damping N80-33785
Ring element dynamic stresses N80-33786
An enhancement of NASTRAN for the seismic analysis of structures — nuclear power plants N80-33787
Solution of enforced boundary motion in direct transient and harmonic problems N80-33788
On the application of nonlinear load elements to thermal analyses using the NASTRAN thermal analyzer N80-33789
NASTRAN analysis of heat-transfer fluid fill pipe failure N80-33790
A NASTRAN investigation of simulated projectile damage effects on a UH-1B tail boom model N80-33791
Finite circular plate on elastic foundation centrally loaded by rigid spherical indenter N80-33792
Elastic-plastic analysis using a triangular ring element in NASTRAN N80-33793
Development and analysis of the learjet 54/55 fuselage NASTRAN model using substructure techniques N80-33794
Comparison of finite element analysis of a piping tee using NASTRAN and CORTES/SA N80-33795

NATIONAL AVIATION SYSTEM
Analysis of general aviation single-pilot IFR incident data obtained from the NASA aviation safety reporting system
[NASA-TM-80206] N80-33384

NATURAL SATELLITES
Saturn: Origin and composition of its inner moons and rings
[NASA-CR-163630] N80-34320

NAVIER-STOKES EQUATION
Numerical solution techniques for unsteady transonic aerodynamics problems N80-33379
The theory of two dimensional separated flows
[RAE-LIB-TRANS-2002] N80-33697
A rapid implicit-explicit solution to the two-dimensional time dependent incompressible Navier-Stokes equations
[NASA-CR-3330] N80-33718
Computation of discrete hole film cooling flow
[AD-A088807] N80-33723

NAVIGATION AIDS
Shuttle OFT Level C navigation requirements
[NASA-TM-8221] N80-33457
Development of an automatic system for plotting synoptic charts
[INPE-1786-RPE/158] N80-34025

NAVIGATION INSTRUMENTS
Omega navigation system. Citations from the NTIS data base
[PB80-812712] N80-33390
NAVIGATION SATELLITES
Geodetic positioning using a global positioning system of satellites
[NASA-CR-163609] N80-33691
NAVIGATION TECHNOLOGY SATELLITES
Performance of the solar cell experiment on the NTS-2 satellite — navigation technology satellite
N80-33695
NAVY
Spectral distributions 5: Visible spectra of standard and improved green flare compositions
[AD-A089055] N80-33587
New capacities and modifications for NASTRAN level 17.5 at DTNSRDC N80-33783
NEAR FIELDS
Analytical compensation for near-field probe positioning errors in calculated far-field antenna patterns N80-33629
NEAR INFRARED RADIATION
A deep near-infrared objective-prism survey for carbon stars toward the galactic center and anticenter N80-34305
NEON
Inclusive study of 200 GeV/c pi-neon interactions
N80-34232
NEPHANALYSIS
A study of the microstructure of convective clouds: Observation and theory N80-34019
NERVES
New engineering approaches to noninvasive His-Purkinje system recordings N80-34087
NETWORK ANALYSIS
Real-time telephone traffic simulation using learning automata routing
[S/IS-7909] N80-34148
Simulation study of telephone traffic routing using learning algorithms, part 2
[S/IS-7907-PT-2] N80-34149
NEUROPHYSIOLOGY
Development of neurophysiological and behavioral metrics of human performance
[AD-A087840] N80-34100
NEW ENGLAND (US)
Detection and assessment of secondary sonic booms in New England
[AD-A089160] N80-33362
NEW YORK
A study of ice nucleus concentrations in eastern New York State N80-34017
NICKEL
The passivity of nickel-effects of applied potential, solution pH and environmental temperature
N80-33553
Origin of magnetic properties in amorphous metals
[AD-A089145] N80-33560
NICKEL ALLOYS
Electron microscopical investigation on the age hardening of spring alloys based on Co-Ni-Cr-Fe
[BLL-RTS-12152] N80-33526
Hydrogen transport in nickel base superalloys
N80-33552
NICKEL COATINGS
Chemical nickel-plating with sodium borohydride. Process technology and properties of coats
[BLL-RTS-12156] N80-33532
The diffusion of copper into gold coatings at elevated temperatures
[BLL-RTS-12292] N80-33535
NICKEL HYDROGEN BATTERIES
Status of nickel-hydrogen cell technology
N80-33474
NICKEL PLATE
The use of current-less (chemical) nickel-plating in vacuum-and-precision- engineering
[BLL-RTS-12025] N80-33525
NICKEL ZINC BATTERIES
Nickel-zinc batteries for RPV applications
[AD-A088594] N80-33908
NIGHT
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland
[E80-10228] N80-33829
NIOBIUM ALLOYS
Long-time creep behavior of the niobium alloy C-103
[NASA-TP-1727] N80-33555
NITROGEN OXIDES
Energy efficient engine
[NASA-CR-159695] N80-33408
Kinetic and photochemical data for atmospheric chemistry reactions of the nitrogen oxides
[PB80-196799] N80-34009
NOBLE METALS
Noble metal electroplated coatings on printed circuit connectors — gold coatings
[BLL-RTS-12265] N80-33537
NOISE INTENSITY
Predicted airframe noise levels
[NASA-TM-81949] N80-34218
NOISE MEASUREMENT
Detection and assessment of secondary sonic booms in New England
[AD-A089160] N80-33362
A case study of environmental noise evaluation
[NPL-AR-96] N80-33925
Washington National Airport flight extension test. Noise monitoring data report
[AD-A089111] N80-33968
NOISE POLLUTION
Washington National Airport flight extension test. Noise monitoring data report
[AD-A089111] N80-33968
NOISE PREDICTION (AIRCRAFT)
A case study of environmental noise evaluation
[NPL-AR-96] N80-33925
An evaluation of a computer code based on linear acoustic theory for predicting helicopter main rotor noise — CH-53A and S-76 helicopters
[NASA-CR-159339] N80-34217
Aircraft noise prediction program validation
[NASA-CR-159333] N80-34219
NOISE REDUCTION
Implications of requiring new production of older aircraft types (less than 75,000 pounds) to meet amended noise standards
[AD-A088577] N80-33967
Acoustic plane waves incident on an oblique clamped panel in a rectangular duct
[KU-FRL-417-14] N80-34215
NOISE TEMPERATURE
Noise adding radiometer performance analysis
N80-33441
NOMOGRAPHS
Non-quadratic nomography, chapter 2
[BLL-RTS-12290] N80-34166
Some problems of practical nomography
[BLL-RTS-11700] N80-34167
NONAQUEOUS ELECTROLYTES
Battery electrolytes. Citations from the NTIS data base
[PB80-809629] N80-33915
Battery electrolytes. Citations from the Engineering Index data base
[PB80-809637] N80-33916
NONDESTRUCTIVE TESTS
Investigations into the distribution of the layer thickness produced by barrel electroplating in the case of cyanic silver plating
[BLL-RTS-12204] N80-33538
An electrical method of measuring strain and damage N80-33620
Evaluation of in-line nondestructive assay systems
[LA-8411-PR] N80-33755
NONEQUILIBRIUM CONDITIONS
Phonon-induced nonequilibrium states in superconducting films: A kinetic equation study
N80-34263
NONGRAY GAS
An accurate and computationally fast formulation for radiative fields and heat transfer in general, plane-parallel, non-gray media with anisotropic scattering N80-33713
NONLINEAR EQUATIONS
Some formulas for the crack opening stress level
[M-368] N80-33780
Optimal linear estimation applied to the generation of a direct method for investigating parameter optimization
[INPE-1855-RPE/209] N80-34187
NONLINEAR OPTICS
Three wave nonlinear interactions in dispersive media N80-34245
Some aspects of the nonlinear interaction of light and matter N80-34248
Some aspects of the nonlinear interaction of light and matter N80-34257
NONLINEAR SYSTEMS
Spectral growth and nonlinear characteristics of wind waves in Lake Ontario
[PB80-193261] N80-33850
Mathematical simulation of the transport of oxygen and important metabolites in the human brain
N80-34092
Identification of a nonlinear system by means of the modified GMDH
[BLL-TRANS-1446] N80-34135
The stability of planar dynamical systems linear-in-cones
[CSIR-TWISK-137] N80-34212
NONLINEARITY
A study of RF nonlinearities in nickel
[AD-A088770] N80-33562
The danger of intermodulation generation by RF connector hardware containing ferromagnetic materials
[AD-A088768] N80-33657
Connector design techniques to avoid RFI
[AD-A088769] N80-33686
NONUNIFORM FLOW
The problem of wind tunnel flow nonuniformity in free-model aircraft dynamic stability
[CSIR-NIAST-79-60] N80-33352
NORMAL DENSITY FUNCTIONS
Interval estimation, ranking and selection procedures N80-34197
Some screening procedures based on data from a singly truncated bivariate normal distribution
N80-34200
NORTHERN HEMISPHERE
Dynamic transport of inert tracers by growing baroclinic and stationary planetary waves in the lower stratosphere of the Northern Hemisphere in winter
N80-33986
Circulation seasons in the Northern Hemisphere and the changes in their duration in the twentieth century
[BLL-TRANS-1455-(9022.549)] N80-34014
NOTCH STRENGTH
Analysis of residual stresses resulting from cold rolling of notches and their effect on fatigue behavior
[AD-A089110] N80-33807
NOTCH TESTS
Stress gradients around notches
[LR-297] N80-33779
NOVA LASER SYSTEM
Nova: A high energy laser system
[UCRL-83204] N80-33740
NOZZLE DESIGN
Study for conceptual design of VEO, VTOL exhaust nozzle
[NASA-CR-152388] N80-33397
NOZZLE THRUST COEFFICIENTS
Numerical method for predicting flow characteristics and performance of nonaxisymmetric nozzles. Part 2: Applications
[NASA-CR-3264] N80-33354
NUCLEAR FUEL REPROCESSING
Automated calibrations and dynamic corrections for differential pressure transmitters
[AGNS-35900-CONF-65] N80-33730
NUCLEAR FUSION
Pulsed power accelerators for particle beam fusion
[SAND-80-0550C] N80-34239
NUCLEAR MAGNETIC RESONANCE
Oxygen and nitrogen nuclear magnetic resonance studies of amides and aromatic aldehydes and ketones N80-33514
Ionic interactions in the liquid state by multinuclear magnetic resonance N80-33516
Continuous irradiation methods for nuclear resonance line-narrowing N80-34233
NUCLEAR POWER PLANTS
Explosion hazards of transport gases: Research within the reactor safety program of the Federal Republic of Germany N80-33586
The gas cloud explosion program on the PNP-project — prototype plant nuclear process heat N80-33587
An enhancement of NASTRAN for the seismic analysis of structures — nuclear power plants
N80-33787

NUCLEAR REACTIONS
Radiative capture studies of the electromagnetic decays of highly excited states
[DOE/ER-01388/443] N80-33667
Atomic effects in nuclear reactions N80-34229

NUCLEATE BOILING
Superheating and boiling of water in hydrocarbons and of hydrocarbon mixtures N80-33709

NUCLEATION
Fracture and flow of iron and its alloys: Theory and experiment N80-33554
Homogeneous vapor phase nucleation of large polar molecules under Limiting experimental conditions: High temperatures, low pressures, and long growth times — cloud chamber studies N80-34224

NUMERICAL ANALYSIS
Calculation of three-dimensional unsteady transonic flows past helicopter blades
[NASA-TP-1721] N80-33356
Analytical and numerical solutions for mass diffusion in a composite cylindrical body N80-33698
Theoretical and numerical analyses of anelastic materials at finite strain N80-33761
Numerical analysis of equilibrium problems in incompressible nonlinear elasticity N80-33783
A numerical study of the efficiency with which aerosol particles collide with simple planar ice crystals N80-33985
Numerical study of baroclinic instability
[NASA-CR-161980] N80-33992
A numerical study of motion and spindown characteristics of an isolated cyclonic oceanic vortex N80-34045
The size of numbers in the analysis of certain algorithms N80-34142
Non-quadratic nomography, chapter 2
[BLL-RTS-12290] N80-34166
An evaluation of a computer code based on linear acoustic theory for predicting helicopter main rotor noise — CH-53A and S-76 helicopters
[NASA-CR-159339] N80-34217

NUMERICAL CONTROL
Nova: A high energy laser system
[UCRL-83204] N80-33740
Programming alternatives for NC machines tools
[TSD-T-79106] N80-34163

NUMERICAL FLOW VISUALIZATION
WIND: Computer program for calculation of three dimensional potential compressible flow about wind turbine rotor blades
[NASA-TP-1729] N80-33357

NUMERICAL INTEGRATION
Determining the form factors of plane and cylindrical surfaces by numerical methods
[INPE-1815-RPE/183] N80-34185

NUMERICAL STABILITY
Steady state spurious errors in shock-capturing numerical schemes
[KTH-AERO-TN-60] N80-33353

NUMERICAL WEATHER FORECASTING
Structure, mechanism and prediction of orographically enhanced rain in Britain N80-33814
Experiments concerning catagorical forecasts of open-ocean visibility using model output statistics
[AD-A088790] N80-34035

O

OBLIQUE SHOCK WAVES
Steady state spurious errors in shock-capturing numerical schemes
[KTH-AERO-TN-60] N80-33353
Acoustic plane waves incident on an oblique clamped panel in a rectangular duct
[KU-FRL-417-14] N80-34215

OBLIQUE WINGS
Technical Review, volume 15, no. 1
[ISSUE-1] N80-33337
The oblique wing-research aircraft N80-33338

OBSERVATION
A mathematical approach to empirical astrophysics with applications N80-34308

OCEAN BOTTOM
Effects of bottom topography on ocean currents N80-33817
Investigations of medium wavelength magnetic anomalies in the eastern Pacific using Magsat data
[E80-10334] N80-33833
Origin and occurrence of selected world wide calcrete deposits N80-33964
Assessment of seabed seismic systems
[PB80-195985] N80-34010
Long wave trapping by a linear ridge topography
[AD-A088840] N80-34051

OCEAN CURRENTS
Effects of bottom topography on ocean currents N80-33817
The Transfer of Pollutants in Two Southern Hemispheric Oceanic Systems
[REPT-39] N80-33961
A model of wind-forced viscous circulation near coastal boundaries N80-34044
The SWAB (Spectral Wave And Bar) program
[PB80-196041] N80-34052

OCEAN MODELS
Proceedings of the Workshop on Government Oil Spill Modeling
[NASA-CR-163640] N80-33979
Wave information study for United States coastlines. Report 1: Surface pressure field reconstruction for wave hindcasting purposes
[AD-A089150] N80-34029
Low frequency sea level variability along the west coast of North America N80-34046

OCEAN SURFACE
Surface energy budget of the Tropical Pacific Ocean
[AD-A089148] N80-34030
A model of wind-forced viscous circulation near coastal boundaries N80-34044
Properties of the oceans reflected in the sea-bed distribution of quaternary planktonic Foraminifera: Including a study of the limits of empirical Paleo-Oceanographic models and the recognition and interpretation of faunal assemblages lacking modern counterparts N80-34047

OCEANOGRAPHIC PARAMETERS
Climatic maps of the sea surface-air difference in vapour pressure and in potential temperature over the eastern Indian Ocean
[AD-A089022] N80-34050
Ocean wave sensing. Citations from the NTIS data base
[PB80-812678] N80-34053
Properties of the oceans reflected in the sea-bed distribution of quaternary planktonic Foraminifera: Including a study of the limits of empirical Paleo-Oceanographic models and the recognition and interpretation of faunal assemblages lacking modern counterparts N80-34047
Tidal prediction program
[CSIR-SEA-8001] N80-34049

OCEANOGRAPHY
The United States space observation policy
[NASA-TM-76373] N80-33425

OFFSHORE ENERGY SOURCES
The use of computer-controlled manipulators in underwater technology
[DFVLR-MITT-78-02] N80-34117

OHMIC DISSIPATION
Power losses in liquid metal current collectors
[AD-A086527] N80-33684

OIL SLICKS
Proceedings of the Workshop on Government Oil Spill Modeling
[NASA-CR-163640] N80-33979

OLIVINE
Carbonate formation on Mars — environment simulation N80-34314

OMEGA NAVIGATION SYSTEM
Omega navigation system. Citations from the NTIS data base
[PB80-812712] N80-33390

ONBOARD DATA PROCESSING
RAMP: A fault tolerant distributed microcomputer structure for aircraft navigation and control
[NASA-CR-163615] N80-33415
High speed lookup table approach to radiometric calibration of multispectral image data
[NASA-TP-1741] N80-33463

OPERATING SYSTEMS (COMPUTERS)
Improvements in sparse matrix operations of NASTRAN N80-33784
Coupling of IBM and Siemens systems on RJE-basis as implemented in Regional Computer Center for the Mannheim and Heidelberg Universities
[DFVLR-MITT-78-02] N80-34120

OPERATORS (MATHEMATICS)
Two dimensional smoothing of a vector Laplacian random field with application to geodesy N80-33982
Applications of non-self-adjoint operator theory to the Singularity Expansion Method (SEM) and the Eigenmode Expansion Method (EEM) in acoustic and electromagnetic problems
[AD-A088747] N80-34191
Tensor products and Banach ideals of p-compact operators
[CSIR-TWISK-132] N80-34211

OPTICAL COMMUNICATION
Digital phase modulated fiber optical communication system N80-33831
Intercommunications in real time, redundant, distributed computer system
[NASA-CR-163604] N80-33842

OPTICAL COUPLING
Digital phase modulated fiber optical communication system N80-33831

OPTICAL DATA PROCESSING
Batch processing with the radiodidine laser induced-fluorescence detector
[AD-A088773] N80-33988
Reading handwritten words using hierarchical relaxation N80-34181
Non-projective transformations in optics N80-34248
Synthesis of generalized coherent optical processor
[AD-A088689] N80-34253

OPTICAL DENSITY
Turbid water measurements of remote sensing penetration depth at visible and near-infrared wavelength
[NASA-TM-81843] N80-33927

OPTICAL EQUIPMENT
Synthesis of generalized coherent optical processor
[AD-A088689] N80-34253

OPTICAL MEASUREMENT
Applications of computer-generated holograms in optical testing N80-33727
Generalized ray tracing, generalized bending and use of caustic surfaces as merit functions in optical design N80-34247

OPTICAL POLARIZATION
Determination of surface active materials by square-wave polarography (polarography with rectangular wave)
[BLL-RTS-12170] N80-34243

OPTICAL PROPERTIES
Electrochemically deposited cadmium telluride films and their application to solar cells N80-33853

OPTICAL PUMPING
Laser excited nonresonant fluorescence spectroscopy
[ATR-80(7783)-1] N80-33523

OPTICAL RADAR
Research in aeronomy
[NASA-CR-163610] N80-33896

OPTICAL REFLECTION
Selective reflection of light at a solid-gas interface and its application N80-34244

OPTICAL RESONATORS
Analysis of unstable optical resonators
[AD-A088600] N80-34255

OPTICAL TRACKING
Advanced electro-optical tracker/ranger
[AD-A089143] N80-34254

OPTICAL WAVEGUIDES
Single-mode laser studies: Design and performance of a fixed-wave length source and coupling of lasers to thin-film optical waveguides
[NASA-CR-3341] N80-33735

OPTIMAL CONTROL
Optimal controls that maximize the probability of being in a given set at a given time
[CSIR-TWISK-135] N80-34182
Optimal linear estimation applied to the generation of a direct method for investigating paramster optimization
[INPE-1855-RPE/209] N80-34187

OPTIMIZATION
An analysis of Pascal programs and several basic block optimizations N80-34140

Optimal linear estimation applied to the generation of a direct method for investigating parameter optimization
[INPE-1855-RPE/209] N80-34187

ORBIT CALCULATION
Operational data handling: An essential need for the accurate determination of satellite orbits
[DFVLR-MITT-79-02] N80-34118

ORBIT DECAY
Determination and maintenance of Earth orbits with arcs of minimum altitude variation N80-33447

ORBITAL LIFETIME
Sun Series program for the REEDA System — predicting orbital lifetime using sunspot values
[NASA-CR-161579] N80-34327

ORBITAL MECHANICS
Analytic theory of orbit contraction and ballistic entry into planetary atmospheres
[NASA-CR-163627] N80-33448

ORBITAL POSITION ESTIMATION
Operational data handling: An essential need for the accurate determination of satellite orbits
[DFVLR-MITT-79-02] N80-34118

ORBITAL RENDEZVOUS
Shuttle OFT Level C navigation requirements
[NASA-TM-82221] N80-33457
Investigation of electrodynamic stabilization and control of long orbiting tethers
[NASA-CR-161584] N80-33748

ORBITAL SERVICING
Power management N80-33475

ORGANIC COMPOUNDS
Source emission measurements of volatile organic chemicals
[PB80-198518] N80-33974
The revised organic chemical producers data base system
[PB80-199605] N80-34287

ORGANIC SILICON COMPOUNDS
Formation of organosilicon compounds. 58: Synthesis of a carbosilane with propellane structure
[RAE-LIB-TRANS-2029(5207)] N80-33483

ORGANOMETALLIC COMPOUNDS
Formation of organosilicon compounds. 58: Synthesis of a carbosilane with propellane structure
[RAE-LIB-TRANS-2029(5207)] N80-33483

ORGANS
The role of temperature in experiments on biological objects under extreme conditions N80-34080

OROGRAPHY
Orographic effects in planetary flows
[GARP-PUBL-23] N80-33811
Influence of orography on the atmospheric general circulation N80-33812
Structure, mechanism and prediction of orographically enhanced rain in Britain N80-33814
Mountain waves and momentum flux N80-33815
Modification of the boundary layer by orography N80-33816
Cyclogenesis in the lee of orography and its numerical modeling with special reference to the Alps N80-33818
Orographic effects revealed by satellite pictures: Mesoscale flow phenomena N80-33820
Orographically controlled cross-equatorial flow N80-33821

ORTHOSTATIC TOLERANCE
Reactions to LBNP test of the crew of the Salyut 5 orbital station N80-34081
Static endurance of rats after flight aboard the Cosmos 936 biosatellite N80-34083
Effect of antiorthostatic hypokinesis and space flight factors on change in leg volume N80-34072
Some of the physiological effects of 30 day bed rest with the body in different positions N80-34073
Circadian rhythm of human body temperature in antiorthostatic position N80-34074

ORTHOTROPISM
Dynamic fractures in orthotropic fiber composites N80-33486

OSCILLATING FLOW
Experimental determination of the admittances of solid propellants by the impedance tube technique N80-33484

OSCILLATIONS
Mathematical modeling of two-phase flow oscillations N80-33707

OSCILLATORS
IBIG standard for pulse repetition frequencies and reference oscillator frequency for C-band radars
[AD-A088545] N80-33666
Frequency skipping in negative-resistance oscillators with applications to crystal-controlled monolithic phase-locked loops N80-33677
Impact oscillator waveguides
[INPE-1818-RPE/184] N80-33682
Optimal controls that maximize the probability of being in a given set at a given time
[CSIR-TWISK-135] N80-34162

OVERPRESSURE
Unconfined hydrocarbon air mixture explosion studies performed in France by CEA-EDF-GDF and the University N80-33585
Explosion hazards of transport gases: Research within the reactor safety program of the Federal Republic of Germany N80-33586

OXIDE FILMS
Analysis of unstable optical resonators
[AD-A088600] N80-34255

OXYGEN
Oxygen and nitrogen nuclear magnetic resonance studies of amides and aromatic aldehydes and ketones N80-33514

OXYGEN CONSUMPTION
Differences in certain physiological, biomechanical, and subjective measures of work effect between males and females while backpacking N80-34089

OXYGEN METABOLISM
Mathematical simulation of the transport of oxygen and important metabolites in the human brain N80-34092

OZONE
Proceedings of the NATO Advanced Study Institute on Atmospheric Ozone and its variation and human influences
[AD-A088999] N80-34006

OZONOMETRY
In situ ozone data for evaluation of the laser absorption spectrometer ozone remote sensor: 1979 southeastern Virginia urban plume study summer field program
[NASA-TM-81831] N80-33929

P

P-N JUNCTIONS
The influence on the front metal coverage factor on the open-circuit voltage of silicon solar cells N80-33692
Ion implantation of wide bandgap semiconductors
[AD-A089026] N80-34268

PACIFIC OCEAN
Investigations of medium wavelength magnetic anomalies in the eastern Pacific using Magsat data
[E80-10334] N80-33833
Surface energy budget of the Tropical Pacific Ocean
[AD-A089148] N80-34030
Low frequency temperature fluctuations in the upper 400 meters of the central North Pacific N80-34042

PACKET SWITCHING
Coding for spread spectrum packet radios
[NASA-CR-163629] N80-33639

PALLADIUM ALLOYS
The deposition of palladium coatings with low hydrogen content and stress in sulphuric acid electrolyte
[BLL-RTS-12267] N80-33534

PAPER CHROMATOGRAPHY
Polyfungin, a new antifungal antibiotic. 4: The use of thin layer chromatography for determining the qualitative composition of the polyfungin complex
[BLL-RTS-12381] N80-34054

PARABOLIC REFLECTORS
Properties of solar generators with reflectors and radiators — in a space environment N80-33001

PARALLEL COMPUTERS
The recognition of straight line patterns by bus automations using parallel processing N80-34138

PARALLEL PROCESSING (COMPUTERS)
Specification and verification of communications in parallel systems N80-34108
The recognition of straight line patterns by bus automations using parallel processing N80-34138

PARAMETERIZATION
VASCOMP 2. The V/STOL aircraft sizing and performance computer program. Volume 6: User's manual, revision 3
[NASA-CR-163639] N80-33401

PARTIAL DIFFERENTIAL EQUATIONS
Errors in finite-difference computations on curvilinear coordinate systems
[NASA-CR-163601] N80-34178
Boundary controllability of hyperbolic partial differential equations
[CSIR-TWISK-126] N80-34180

PARTICLE ACCELERATORS
Pulsed power accelerators for particle beam fusion
[SAND-80-0550C] N80-34239

PARTICLE BEAMS
Pulsed power accelerators for particle beam fusion
[SAND-80-0550C] N80-34239

PARTICLE COLLISIONS
A numerical study of the efficiency with which aerosol particles collide with simple planar ice crystals N80-33985
Theoretical study of state-to-state collisions
[AD-A088746] N80-34270

PARTICLE DENSITY (CONCENTRATION)
Instantons and fermion densities N80-34273

PARTICLE EMISSION
Fine particle emissions information system
[PB80-195753] N80-33981

PARTICLE ENERGY
Effects of heavy particles at low energies N80-34231

PARTICLE INTERACTIONS
A numerical study of the efficiency with which aerosol particles collide with simple planar ice crystals N80-33985

PARTICLE PRECIPITATION
Operating experiences with improved rapping on electrostatic precipitators treating fly ash from high and low sulphur coals N80-33956

PARTICLE SIZE DISTRIBUTION
Vaporization of droplets in premixing chambers
[NASA-CR-163616] N80-33714
Ambient air quality monitoring systems: State of the art N80-33958
Possibilities and limitations of different types of dispersion models with respect to air quality management N80-33959

PARTICLE THEORY
Precise predictions of grand unified gauge theories N80-33627

PARTICLES
Fine particle emissions information system
[PB80-195753] N80-33981

PARTICULATE SAMPLING
Carbon fiber plume sampling for large scale fire tests at Dugway Proving Ground — fiber release during aircraft fires
[NASA-CR-159215] N80-33492
A method for routine isokinetic dust sampling N80-33942

PASCAL (PROGRAMMING LANGUAGE)
An analysis of Pascal programs and several basic block optimizations N80-34140

PASSENGERS
Passenger comfort technology for system decision making
[NASA-TM-81875] N80-34096

PASSIVITY
The passivity of nickel-effects of applied potential, solution pH and environmental temperature N80-33553

PATCH TESTS
A crack opening displacement approach to crack patching
[ARL/STRUC-NOTE-455] N80-33797
A design study in crack patching
[ARL/STRUC-REPT-376] N80-33798

PATENT POLICY
NASA patent abstracts bibliography. A continuing bibliography with indexes, supplement 17, section 2, July 1980
[NASA-SP-7039(17)-SECTION-2] N80-34284

PATTERN RECOGNITION
A multi-step method for avalanche zone recognition and analysis — San Juan Mountains (co) N80-33824
Utilization of spectral-spatial information in the classification of imagery data
[E80-10321] N80-33832

Contributions of LANDSAT imagery to the geological mapping of the Rio do Grande Sul Shield — Brazil [INPE-1838-RPE/199] N80-33842
Statistical classification of ice particles and raindrops by pattern recognition techniques N80-34021
The recognition of straight line patterns by bus automations using parallel processing N80-34138
Image feature manuscript generation [AD-A088884] N80-34152

PAVEMENTS
Material characterization for studing flexible pavement behavior in fatigue and permanent deformation N80-33611

PAYLOAD RETRIEVAL (STS)
Investigation of electrodynamic stabilization and control of long orbiting tethers [NASA-CR-161584] N80-33748

PAYLOADS
Extravehicular Crewman Work System (ECWS) study program. Volume 2: Construction [NASA-CR-163698] N80-34102

PCM TELEMETRY
Computer assisted performance tests of the Lyman Alpha Coronagraph [NASA-CR-163622] N80-33462

PEENING
Effect of multiple shot peening/cadmium plating on high strength steel [AD-A088667] N80-33561

PENNING EFFECT
Molecular beam chemiluminescent investigation of the inelastic collisions of rare gas metastable atoms N80-34223

PERCEPTION
Effects of transmeridional flights and highland conditions on different forms of memory N80-34088

PERFORMANCE
A parametric analysis of performance characteristics of satellite-borne multiple-beam antennas [NASA-CR-163632] N80-33641

PERFORMANCE PREDICTION
Experimental performance and analysis of 15.04-centimeter-tip-diameter, radial-inflow turbine with work factor of 1.126 and thick blading [NASA-TP-1730] N80-33410

PERFORMANCE TESTS
Precision I-band DME tests [AD-A089053] N80-33388
Verification test of the change-of-pace station wagon [AD-A089059] N80-34297
Verification test of the battronic mini van [AD-A089058] N80-34298

PERITONEUM
Tissue response to peritoneal implants [NASA-CR-159817] N80-33478

PERMEABILITY
Hydrogen transport in nickel base superalloys N80-33552

PERSONNEL
Management guidance for research climate N80-34280

PETROLOGY
Comparative petrology of the Apollo 11 mare basalt, part 1. The oxygen isotope geochemistry of the Abitibi greenstone belt, part 2 N80-34313

PH
Trace analysis of antimony by differential pulse anodic stripping voltammetry N80-33507
The passivity of nickel-effects of applied potential, solution pH and environmental temperature N80-33553
Polyfungin, a new antifungal antibiotic. 4: The use of thin layer chromatography for determining the qualitative composition of the polyfungin complex [BLL-RTS-12381] N80-34054

PHARYNX
A study of human throat-wall and vocal tract from input/output measurements N80-34091

PHASE LOCKED SYSTEMS
Diffusion approximations for the analysis of digital phase locked loops [AD-A088703] N80-33689

PHASE MODULATION
Digital phase modulated fiber optical communication system N80-33631
A fiber optic transmission line stabilization apparatus and method [NASA-CASE-NPO-15036-1] N80-34250
Some aspects of the nonlinear interaction of light and matter N80-34257

PHASE SHIFT
Oscillatory beam quality effects in modular high energy laser systems [AD-A088655] N80-33736

PHASE SHIFT CIRCUITS
A fiber optic transmission line stabilization apparatus and method [NASA-CASE-NPO-15036-1] N80-34250

PHASED ARRAYS
Effect of downlink phased array patterns on system availability contour predictions [AD-A088664] N80-33661

PHENOLOGY
A model of plant canopy polarization response [E80-10336] N80-33635

PHILOSOPHY
A philosophy for clean air N80-33930

PHONETICS
A study of human throat-wall and vocal tract from input/output measurements N80-34091

PHONONS
Phonon-induced nonequilibrium states in superconducting films: A kinetic equation study N80-34263

PHOTOCHEMICAL REACTIONS
Assigning reactive excited states in inorganic photochemistry [AD-A088566] N80-33521
Kinetic and photochemical data for atmospheric chemistry reactions of the nitrogen oxides [PB80-198799] N80-34009

PHOTOCONDUCTIVE CELLS
Control of the recombination time in photoconductive detectors [INPE-1814-RPE/182] N80-33681

PHOTODIODES
Comparative performance of HgCdTe photodiodes for heterodyne application [NASA-TP-1745] N80-33683
A linear photodiode array employed in a short range laser triangulation obstacle avoidance sensor — Martian roving vehicle sensor [NASA-CR-163613] N80-33747
Meeting of the IRIS specialty group on infrared detectors, volume 1 [ERIM-139600-3-X(I)] N80-34241

PHOTOELASTIC ANALYSIS
Birefringent coating technique, photoelastic stress analysis [AD-A088657] N80-33799
Stress intensity distributions for natural flaw shapes approximating benchmarch geometries [PB80-200785] N80-33810

PHOTOELECTRIC CELLS
Characterization of three types of silicon solar cells for SEPS Deep Space Mission. Volume 3: Current-voltage characteristics of spectrolab sculptured BSR/P+ (K7), BSR/P+ (K6.5) and BSR (K4.5) cells as a function of temperature and intensity [NASA-TM-78305] N80-33863

PHOTOELECTRIC GENERATORS
Solar heating system at Quitman County Bank, Marks, Mississippi [NASA-CR-161549] N80-33858

PHOTOELECTRONS
Characterization of surface complexes on lithium N80-33548

PHOTOGEOLOGY
Contributions of LANDSAT imagery to the geological mapping of the Rio do Grande Sul Shield — Brazil [INPE-1838-RPE/199] N80-33842
Digital filtering of LANDSAT images as a visual aid technique in geological photointerpretation [INPE-1823-RPE/189] N80-33843

PHOTOGRAMMETRY
Monitoring by aerial and terrestrial photogrammetry [PB80-192925] N80-33976

PHOTOGRAPHS
A method of measuring the visibility of military objects [RAE-LIB-TRANS-1561(5207)] N80-34242
Voyager encounters Jupiter [NASA-CR-163607] N80-34318

PHOTOINTERPRETATION
Digital filtering of LANDSAT images as a visual aid technique in geological photointerpretation [INPE-1823-RPE/189] N80-33843

PHOTOLYSIS
Assigning reactive excited states in inorganic photochemistry [AD-A088566] N80-33521

PHOTOMETERS
Development and evaluation of a prototype automated telephotometer system [EPRI-EA-1434] N80-33731
Meeting of the IRIS specialty group on infrared detectors, volume 1 [ERIM-139600-3-X(I)] N80-34241

PHOTOMETRY
Photometry and colorimetry of retroreflection: State-of-measurement-accuracy report [PB80-201783] N80-34256

PHOTOMICROGRAPHY
In situ experiments in the 1 MV electron microscope. Part 1: Feasibility and methodology N80-33618
Digital image processing of conventional transmission electron micrographs N80-34229

PHOTONS
Astronomical telescope for photons-gamma rays of low energy (approximately 4 MeV using the difference method like a Venetian blind [INPE-1807-RPE/175] N80-34306
Effective depth of spectral line formation in planetary atmospheres [NASA-CR-163617] N80-34319

PHOTOSENSITIVITY
Meeting of the IRIS specialty group on infrared detectors, volume 1 [ERIM-139600-3-X(I)] N80-34241

PHOTOSPHERE
Mesogranulation and supergranulation in the Sun N80-34325

PHOTOVOLTAIC CELLS
Photovoltaic technology development for synchronous orbit N80-33470
Electrochemical Orbital Energy Storage (ECOES) technology program — regenerative fuel cell system N80-33473
Photovoltaic generators in space — conference proceedings, Heidelberg, 15-17 Apr. 1980 [ESA-SP-147] N80-33873
Study of the internal mechanics of space photovoltaic generators N80-33878
Potential use of terrestrial photovoltaics for future space solar arrays N80-33882
Aspects of large area and thin silicon solar cell technologies N80-33884
Calibration of photovoltaic solar elements N80-33894

PHOTOVOLTAIC CONVERSION
Large solar arrays N80-33471

PHOTOVOLTAIC EFFECT
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells [DOE/ET-23108/1] N80-33914

PHYSICAL EXERCISE
Cardiorespiratory system reactions of cosmonauts to exercise following long-term missions aboard the Salyut 6 orbital station N80-34060

PHYSICAL FITNESS
Static endurance of rats after flight aboard the Cosmos 936 biosatellite N80-34063

PHYSICAL WORK
Effect of task variable interactions in lifting and lowering N80-34090

PHYSIOLOGICAL EFFECTS
USSR Report: Space Biology and Aerospace Medicine, volume 14, no. 4, 1980 [JPRS-76415] N80-34058
Effect of periodic exposure to head-pelvis accelerations on a short-arm centrifuge on responses of the human cardiovascular system N80-34071
Some of the physiological effects of 30 day bed rest with the body in different positions N80-34073
Effect of conditioning animals for hypoxia on their resistance to poison inhalation N80-34076
Effects of different hygienic factors on exhalation of acetone by man N80-34078
Analysis of changes in evoked bioelectrical activity of the brain during exposure to high-intensity stationary magnetic field N80-34082
Effect of task variable interactions in lifting and lowering N80-34090

PHYSIOLOGICAL RESPONSES
Tissue response to peritoneal implants [NASA-CR-159817] N80-33478
PI-ELECTRONS
Inclusive study of 200 GeV/c pi-neon interactions N80-34232
PILOT PERFORMANCE
Pilot/vehicle model analysis of visual and motion cue requirements in flight simulation — helicopter hovering [NASA-CR-3012] N80-33098
Advanced simulator for pilot training: Design of automated performance measurement system [AD-A088655] N80-33421
Effects of criteria on flight simulation study 1: Heading deviation tolerance [AD-A088908] N80-33423
The role of functional asymmetry of the central nervous system in pilot performance N80-34089
Distinctions of pilot motor activity in different piloting modes during landing approaches N80-34070
PILOT TRAINING
Advanced simulator for pilot training: Design of automated performance measurement system [AD-A088955] N80-33421
PINCH EFFECT
Steady state treatment of relativistic electron beam erosion [AD-A089047] N80-34237
Introduction to magnetic confinement fusion diagnostics [UCID-18704] N80-34240
PIONS
Inclusive study of 200 GeV/c pi-neon interactions N80-34232
PIPE FLOW
Turbulent heat transfer to liquid metals in a circular pipe N80-33705
PIPES (TUBES)
Pulsating flow and heat transfer in curved tubes N80-33712
NASTRAN analysis of heat-transfer fluid fill pipe failure N80-33790
Comparison of finite element analysis of a piping tee using NASTRAN and CORTES/SA N80-33795
PITCHING MOMENTS
Application of identical aerodynamic functions N80-33372
PITTING
Corrosion of fiber composites with aluminum alloy matrixes [AD-A088564] N80-33583
PITUITARY GLAND
Histostructural correlations in the hypothalamus-hypophysis-kidneys system under hypokinetic conditions N80-34075
PLANE STRAIN
The equilibrium field near the tip of a crack for finite plane strain of incompressible elastic materials [AD-A088938] N80-33800
PLANE WAVES
Non-specular ultrasonic bounded beam transmission through solid plates N80-34214
Acoustic plane waves incident on an oblique clamped panel in a rectangular duct [KU-FRL-417-14] N80-34215
PLANETARY ATMOSPHERES
Orographic effects in the atmospheres of other planets — Viking Mars observations N80-33822
Effective depth of spectral line formation in planetary atmospheres [NASA-CR-163617] N80-34319
PLANETARY ENVIRONMENTS
Cytochemical studies of planetary microorganisms explorations in exobiology [NASA-CR-163805] N80-34057
Publications of the exobiology program for 1979: A special bibliography [NASA-TM-82182] N80-34106
PLANETARY GEOLOGY
A bibliography of planetary geology principal investigators and their associates, 1979 - 1980 [NASA-TM-82180] N80-34301
Saturn: Origin and composition of its inner moons and rings [NASA-CR-163630] N80-34320
PLANETARY LIMB
Spectroscopy of the Mars airglow from Mariner 9 ultraviolet spectrometer data N80-34317
PLANETARY MAGNETIC FIELDS
The Jovian magnetosphere N80-34316
PLANETARY SURFACES
Voyager encounters Jupiter [NASA-CR-163607] N80-34318
PLANETARY WAVES
Orographic effects in planetary flows [GARP-PUBL-23] N80-33811
Influence of orography on the atmospheric general circulation N80-33812
Planetary waves: Theory and observation — extratropical waves N80-33813
Dynamic transport of inert tracers by growing baroclinic and stationary planetary waves in the lower stratosphere of the Northern Hemisphere in winter N80-33986
PLANKTON
Properties of the oceans reflected in the sea-bed distribution of quaternary planktonic Foraminifera: Including a study of the limits of empirical Paleo-Oceanographic models and the recognition and interpretation of faunal assemblages lacking modern counterparts N80-34047
PLANT STRESS
The use of radiation temperature to detect water-stress in sugarcane crop — Brazil [INPE-1767-TDL/028] N80-33839
PLASMA CHEMISTRY
Ion-ion neutralization [AD-A080209] N80-34001
PLASMA CONTROL
Introduction to magnetic confinement fusion diagnostics [UCID-18704] N80-34240
Effect of ICRF heating on single particle confinement in Tokamaks [AD-A088578] N80-34261
PLASMA DECAY
Two examples of the decay instability in an inhomogeneous plasma N80-34258
PLASMA DYNAMICS
Research in general physics, plasma dynamics, and communication sciences and engineering [RLE-PR-122] N80-34338
PLASMA HEATING
Mechanisms responsible for topographical changes in PLT stainless steel and graphite limiters [PPPL-1671] N80-33584
Effect of ICRF heating on single particle confinement in Tokamaks [AD-A088578] N80-34261
Coronal heating by stochastic magnetic pumping [NASA-CR-163637] N80-34330
PLASMA JETS
Baffle aperture design study of hollow cathode equipped ion thrusters [NASA-CR-165164] N80-33476
PLASMA PHYSICS
Ion-ion neutralization [AD-A080209] N80-34001
PLASMA TURBULENCE
Radar observations of the equatorial electrojet irregularities and theory of type 1 turbulence N80-33990
PLASMAS (PHYSICS)
Spatially resolved studies of flame and plasma as sources for atomic spectroscopy N80-33511
Experimental investigation of modulational effects in a magnetized plasma N80-34259
Large electrostatic potential variations in laboratory plasmas N80-34260
PLASMOLYSIS
Cytochemical studies of planetary microorganisms explorations in exobiology [NASA-CR-163805] N80-34057
PLASTIC PROPERTIES
Influence of stress interaction on the behavior of off-axis unidirectional composites [NASA-CR-163618] N80-33495
PLASTICIZERS
Fluorinated desensitizing ingredients for propellants [AD-A086704] N80-33598
PLASTICS
Evaluation and prediction of long term space environmental effects on non-metallic materials [NASA-CR-161585] N80-33479
PLATES (STRUCTURAL MEMBERS)
Geometrically nonlinear analysis of rectangular glass panels by the finite element method N80-33776
PLATES (TECTONICS)
Fundamentals studies in geodynamics [NASA-CR-163620] N80-33993
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research [NASA-TM-82215] N80-33999
PLATING
Effect of multiple shot peening/cadmium plating on high strength steel [AD-A089667] N80-33581
PLATINUM
Ion flotation studies and separation procedures for the platinum group metals N80-33545
PLENUM CHAMBERS
Plenum response to simulated disturbances of the model and fan inlet guide vanes in a transonic tunnel [NASA-TM-81569] N80-33418
PLOTTING
Location of multiple outliers in factorial designs, using tetrads [CSIR-TWISK-127] N80-34181
PLUGS
Vapors-liquid phase separator — infrared telescope heat sink [NASA-CR-163621] N80-33717
PLUMES
Carbon fiber plume sampling for large scale fire tests at Dugway Proving Ground — fiber release during aircraft fires [NASA-CR-159215] N80-33492
Remote sounding techniques applied to mesoclimate measurements N80-33948
POINCARE PROBLEM
Four lectures on Poincare gauge field theory [ORO-3992-290] N80-34279
POINTING CONTROL SYSTEMS
TRISCAN: A method of precision antenna positioning N80-33444
POINTS (MATHEMATICS)
Four lectures on Poincare gauge field theory [ORO-3992-290] N80-34279
POISONS
Effect of conditioning animals for hypoxia on their resistance to poison inhalation N80-34076
POISSON EQUATION
Maximum likelihood estimation for stationary point processes [AD-A0E9117] N80-34205
POLAR CAP ABSORPTION
Almost-necessary conditions for a solar active region to produce a subsequent polar cap absorption event [AD-A088882] N80-34003
POLAR REGIONS
Correlation of high latitude coronal holes with solar wind streams high above or below the ecliptic [AD-A087525] N80-34331
POLARIZATION (CHARGE SEPARATION)
Electroplating: Metal deposits by electrolysis, throwing power [BLL-RTS-11870] N80-33527
POLARIZATION (WAVES)
Frequency re-use by polarization on diversity on satellite links [BLL-TRANS-3683] N80-33625
POLARIZED ELECTROMAGNETIC RADIATION
Stimulated emission processes from free electrons N80-33732
POLAROGRAPHY
Determination of surface active materials by square-wave polarography (polarography with rectangular wave) [BLL-RTS-12170] N80-34243
POLICIES
The United States space observation policy [NASA-TM-76373] N80-33425
POLLUTION CONTROL
Energy efficient engine [NASA-CR-159685] N80-33408
Methanol/ethanol/gasoline blend fuels demonstration with stratified charge engine vehicles [PB80-192123] N80-33606
Potential of spark ignition engine, electronic engine and transmission control [PB80-192701] N80-33751
International Conference on Air Pollution, volume 1 [ISBN-0-7988-19651] N80-33929
Methodology for the research of air pollution in urban areas N80-33934

International conference on Air Pollution, volume 2 [ISBN-0-7988-1665-1] N80-33936
Fluidized-bed combustion for pollution control N80-33938
Energy conservation-air pollution abatement project N80-33939
Current techniques for the elimination of airborne mists and soluble solids N80-33940
Progress with a new velocity electric precipitator the Electro-Dynamic Venturo (EDV) N80-33941
Energy: Careful conservation or regulated waste — control of automobile exhaust emissions N80-33951
International Conference on Air pollution, volume 4 N80-33954
Environment: The energy connection N80-33955
Environmental air quality control from the inside looking out N80-33960
Controlling hazardous wastes research summary [PB80-194202] N80-33970
Air Pollution control device configurations [PB80-193253] N80-33972
Electrostatic precipitation research in Japan [PB80-194137] N80-33975

POLLUTION MONITORING
A quantitative evaluation of LANDSAT for monitoring suspended sediments in a fluvial channel N80-33823
Ground water monitoring strategies to support community management of on-site home sewage disposal systems N80-33826
Multispectral techniques for remote monitoring of sediment in water: A feasibility investigation [PB80-196500] N80-33849
In situ ozone data for evaluation of the laser absorption spectrometer ozone remote sensor: 1979 southeastern Virginia urban plume study summer field program [NASA-TM-81831] N80-33928
The prevention of dust emissions in South Africa by electrostatic precipitation N80-33937
A method for routine isokinetic dust sampling N80-33942
The determination of tin oxide in airborne dust N80-33944
Developments in industrial emission measurements: Progress towards an automated isokinetic sampler N80-33945
An improved method for the determination of arsenic and its use for air pollution studies N80-33946
Measurements of carbon monoxide in the southern hemisphere N80-33947
Remote sounding techniques applied to mesoclimate measurements N80-33948
International Conference on Air pollution, volume 4 N80-33954
Ambient air quality monitoring systems: State of the art N80-33958
Possibilities and limitations of different types of dispersion models with respect to air quality management N80-33959
The Transfer of Pollutants in Two Southern Hemispheric Oceanic Systems [REPT-39] N80-33961
Fine particle emissions information system [PB80-195753] N80-33981
Assessment of the role of remote sensing in the study of inland and coastal waters [NASA-TM-81881] N80-34048

POLYCRYSTALS
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells [DOE/ET-23108/1] N80-33914

POLYIMIDE RESINS
Tackifier for addition polyimides [NASA-TM-81883] N80-33570
Polyimides: Thermally stable aerospace polymers [NASA-TM-81884] N80-33571

POLYMER MATRIX COMPOSITE MATERIALS
Hybridized polymer matrix composites [NASA-CR-165146] N80-33489
Evaluation of amorphous ribbon reinforced resin matrix composites [AD-A089102] N80-33501

POLYMERIC FILMS
Development of an electrophoretic image display [AD-A089121] N80-33729

POLYMERIZATION
Radiation-induced graft polymerization of styrene onto cellulose esters N80-33566
Vinyl acetate emulsion polymerization kinetics and mechanism N80-33567
Studies of uniform spherical colloids prepared by emulsion polymerization N80-33568
Preparation of homogeneous living polyvinyl gels with application to solvent purification [AD-A089883] N80-33574
The epitaxial polymerization of (SN)x N80-34264

POLYMETHYL METHACRYLATE
The effect of surface energy on temperature rise around a fast running crack [AD-A088756] N80-33604

POLYNOMIALS
Identification of a nonlinear system by means of the modified GMDH [BLL-TRANS-1446] N80-34135
Topics in analysis [AD-A080463] N80-34189

POLYURETHANE FOAM
Evaluation of solid adsorbents for collecting atmospheric chlorinated hydrocarbons [PB80-198526] N80-33978

POPULATIONS
A unit stratifications sample design using rotational sampling N80-34176
Estimation of the population total when the sample is taken from a list containing an unknown amount of duplication N80-34186

POSITION (LOCATION)
Geodetic positioning using a global positioning system of satellites [NASA-CR-163609] N80-33991

POSITRON ANNIHILATION
Positron annihilation gamma ray lineshape studies of defects in solids [AD-A088856] N80-34267

POSITRONS
Total and differential scattering cross section measurements for positrons and electrons colliding with inert gases N80-34227

POTABLE WATER
Experimental studies of setting standard for optimun salt composition of portable water N80-34077

POTENTIAL ENERGY
Large electrostatic potential variations in laboratory plasmas N80-34260

POTENTIAL FLOW
Vector-potential flow in relativistic beam diodes [AD-A089135] N80-33694

POTENTIOMETRIC ANALYSIS
The determination of uni and tri valent gold in acid gold baths [BLL-RTS-12157] N80-33504

POWDER METALLURGY
Accuracy in powder diffraction: Proceedings of a symposium [PB80-200488] N80-34272

POWER CONDITIONING
Power management N80-33475

POWER EFFICIENCY
Synchronous Energy Technology [NASA-CP-2154] N80-33485
Air Force space power technology program N80-33488

POWER SERIES
Power series expansion for a crossing-symmetric vertex function — the Green's function formulation of the many-body theory [CSIR-TWISK-134] N80-34182
Topics in analysis [AD-A080463] N80-34189

POWER SPECTRA
Equatorial spread F in situ measurements of electron density temperature and density fluctuation power spectra [AD-A089133] N80-34008
Theoretical studies of solar oscillations [NASA-CR-163611] N80-34326

PRECAMBRIAN PERIOD
Comparative petrology of the Apollo 11 mare basalt, part 1. The oxygen isotope geochemistry of the Abitibi greenstone belt, part 2 N80-34313

PRECIPITATION (METEOROLOGY)
A method of correcting daily and monthly values of atmospheric precipitation and results of tests on it [BLL-TRANS-1451-(9022.549)] N80-34028

PRECIPITATION HARDENING
Electron microscopical investigation on the age hardening of spring alloys based on Co-Ni-Cr-Fe [BLL-RTS-12152] N80-33526

PRECIPITATORS
Environmental air quality control from the inside looking out N80-33960

PREDICTION ANALYSIS TECHNIQUES
Analytical methods for prediction of unsteady laminar boundary layers N80-33376
Combined macroscopic and microscopic approach to the fracture of metals [DOE/ER-10566/1] N80-33565
Effect of downlink phased array patterns on system availability contour predictions [AD-A089664] N80-33661
Laminar film flow phenomena-theory and application to the two-phase closed thermosyphon N80-33703
Dispersed flow heat transfer in circular tubes N80-33706
Special engineering services to establish inspection criteria for bearings to improve life prediction [AD-A088765] N80-33754
Impact force prediction using measured frequency response functions N80-33773
Development of a soil moisture model for use with passive microwave remote sensor: N80-33829
Evaluation of hydropower potential in a river basin — Prediction analysis technique N80-33856
Climatological relationships of severe duststorms in the Great Plains to synoptic weather patterns: A potential for predictability [NASA-CR-163626] N80-34022
The SWAB (Spectral Wave And Bar) program [PB80-196041] N80-34052

PREDICTIONS
Sun Series program for the REEDA System — predicting orbital lifetime using sunspot values [NASA-CR-161579] N80-34327

PREPREGS
Tackifier for addition polyimides [NASA-TM-81883] N80-33570

PRESSURE DROP
Orbiter thermal pressure drop characteristics for shuttle orbiter thermal protection system components: High density tile, low density tile, densified low density tile, and strain isolation pad [NASA-TM-81891] N80-33460

PRESSURE GRADIENTS
Wave information study for United States coastlines. Report 1: Surface pressure field reconstruction for wave hindcasting purposes [AD-A089150] N80-34029
NMC model performance in the Northeast Pacific [PB80-196033] N80-34038

PRESSURE MEASUREMENTS
Pressure and flow measurement — flight testing [AGARD-AG-160-VOL-11] N80-33407
A digital unit for measuring unsteady pressure coefficients — in a wind tunnel N80-33319
Automated calibrations and dynamic corrections for differential pressure transmitters [AGMS-35900-CONF-85] N80-33730

PRESSURE PULSES
Evaluation of the effects of detonation in a spherical bomb N80-33594

PRESSURE VESSELS
Evaluation of the effects of detonation in a spherical bomb N80-33594

PRESTRESSING
Seismic stress relaxation phenomena in an inhomogeneously prestressed medium N80-33983

PRINTED CIRCUITS
Noble metal electroplated coatings on printed circuit connectors — gold coatings [BLL-RTS-12265] N80-33537
State and trends in development of the manufacture of printed circuits [BLL-RTS-12266] N80-33672

PRINTING
Integrated screen printed hybrid circuits [BLL-PO-TRANS-3749-(7737.470)] N80-33689

PROBABILITY THEORY
Analysis of Markov renewal processes with some nonregeneration points and their applications to reliability theory N80-33753
Optimal controls that maximize the probability of being in a given set at a given time [CSIR-TWISK-135] N80-34162
Estimation of the larger mean [AD-A088661] N80-34204
A first-order methodology for calculating probability of mission success [AD-A088910] N80-34206

Generalized inverses and their application to applied probability problems — Markov chains
[AD-A089089] N80-34207

PROBLEM SOLVING
Determining the three-dimensional motion and model of objects from a sequence of images
N80-34136
The recognition of straight line patterns by bus automatons using parallel processing N80-34138
Some problems of practical nomography
[BLL-RTS-11700] N80-34167
Parameter estimation in undetermined systems
N80-34172
Ordinary differential equations
[INPE-1753-RPE/144] N80-34184
The use of computers in solving mathematical problems. Citations from the NTIS data base
[PB80-813298] N80-34194

PROCEEDINGS
Flying qualities design criteria
[AD-A089629] N80-33402
Proceedings of the NATO Advanced Study Institute on Atmospheric Ozone and its variation and human influences
[AD-A088889] N80-34006

PROCESS CONTROL (INDUSTRY)
Evaluation of in-line nondestructive assay systems
[LA-8411-PR] N80-33755
Programming alternatives for NC machines tools
[TSD-T-79105] N80-34163

PRODUCT DEVELOPMENT
Photovoltaic technology development for synchronous orbit N80-33470
LARC-13 adhesive development
[NASA-CR-159317] N80-33497
Development and evaluation of a prototype automated telephotometer system
[EPRI-EA-1434] N80-33731

PRODUCTION ENGINEERING
State and trends in development of the manufacture of printed circuits
[BLL-RTS-12266] N80-33672

PROGRAM VERIFICATION (COMPUTERS)
DSN system performance test software
N80-33443
Solution sensitivity and accuracy study of NASTRAN for large dynamic problems involving structural damping N80-33785
TANDEM 16, COBOL -T9201D00
[PB80-190263] N80-34134
A formal program model for discrete event simulation and its use in the verification and validation of system models and implementations N80-34139
A graph theory approach to software evaluation
N80-34145
Verification of abstract types whose representations share storage N80-34283

PROGRAMMING LANGUAGES
Specification and verification of communications in parallel systems N80-34108
Contributions to the symposium: Computer Science in Space Flight — conference proceedings, Oberpfaffenhofen, West Germany, 19 Jan. 1978
[ESA-TT-587] N80-34112
Experimental work place for the EBOSIPES research project
[DFVLR-MITT-78-02] N80-34122
Software for EBOSIPES: Present state and trends
[DFVLR-MITT-78-02] N80-34123
A language for designing software systems
N80-34137

PROJECT MANAGEMENT
A methodology for logical design of databases for project engineering N80-34285

PROJECT PLANNING
Satellite Power Systems (SPS) concept definition study. Volume 2, part 2: System engineering — cost and programmatics
[NASA-CR-3319] N80-33869

PROJECT SETI
The telecommunications and data acquisition report
[NASA-CR-163608] N80-33427
The SETI instrument development plan
N80-33430
A bimodal search strategy for SETI N80-33431

PROJECTIVE GEOMETRY
Bonne's projection of Meteosat images — subroutines
[CSIR-SR-FIS-201] N80-33837

PROTECTION
Effects of flank protection media in the etching of copper — thiourea
[BLL-RTS-12359] N80-33539

PROTECTIVE COATINGS
Chromating
[BLL-RTS-12344] N80-33540
The interaction between pipe-coatings and cathodic corrosion-protection
[BLL-TRANS-T4943/BG/ERS/79] N80-33541
Improved bond coatings for use with thermal barrier coatings
[NASA-TM-81567] N80-33556
Role of surface chemistry in the ignition of pyrotechnic materials
[MLM-2709(OP)] N80-33603

PROTON PRECIPITATION
Relativistic electron precipitation: An observational study N80-33827

PROTON SCATTERING
High-energy proton-proton elastic scattering
N80-34236

PROTON-PROTON REACTIONS
High-energy proton-proton elastic scattering
N80-34236

PROTONS
Inclusive study of 200 GeV/c pi-neon interactions
N80-34232

PROTOTYPES
Development and evaluation of a prototype automated telephotometer system
[EPRI-EA-1434] N80-33731

PSYCHOLOGICAL FACTORS
Management guidance for research climate
N80-34280

PSYCHOPHYSIOLOGY
Effects of transmeridional flights and highland conditions on different forms of memory
N80-34088

PUBLIC HEALTH
International Conference on Air Pollution, volume 1
[ISBN-0-7998-16651] N80-33929
Clean air and health Britain in the 1970's
N80-33931
Environmental air quality control from the inside looking out N80-33960
Health requirements for advanced coal extraction systems
[NASA-CR-163265] N80-34093

PULMONARY LESIONS
Human lung ventilation, mechanics and morphology N80-34085

PULSE CODE MODULATION
DCT/DPCM processing of NTSC composite videosignal N80-33635
Interfield hybrid coding of NTSC component video signals N80-33636
Synchronization tolerance to receiving errors in coded EM and PCM signals transmitted by meteorological satellites
[INPE-1760-RPE/149] N80-33644

PULSE COMMUNICATION
Tropospheric scatter communications. Citations from the NTIS data base
[PB80-812571] N80-33386

PULSE COMPRESSION
Spatial pulse compression
[AD-A084750] N80-33663

PULSE HEATING
Research on low temperature, directed energy processing of very large scale integrated structures
[AD-A088562] N80-33621

PYROLYSIS
Hydroprocessing of light pyrolysis fuel oil for kerosene type jet fuel
[AD-A089101] N80-33599

PYROTECHNICS
Spectral distributions 5: Visible spectra of standard and improved green flare compositions
[AD-A089055] N80-33597
Role of surface chemistry in the ignition of pyrotechnic materials
[MLM-2709(OP)] N80-33603
Thermal and electrostatic initiation of TiH/sub x based pyrotechnics
[MLM-2710(OP)] N80-33604

Q

QUADRATIC PROGRAMMING
On the convergence of a block successive overrelaxation method for a class of linear complementarity problems
[AD-A088760] N80-34154

QUADRUPOLES
Instrumentation development for LASSII equatorial measurements
[AD-A088880] N80-34002

QUALITATIVE ANALYSIS
Polyfungin, a new antifungal antibiotic. 4: The use of thin layer chromatography for determining the qualitative composition of the polyfungin complex
[BLL-RTS-12381] N80-34054

QUALITY CONTROL
Oscillatory beam quality effects in modular high energy laser systems
[AD-A089655] N80-33736
A cusum for a scale parameter — applications to quality control and regression analysis
[CSIR-TWISK-130] N80-34186

QUANTUM EFFICIENCY
Comparative performance of HgCdTe photodiodes for heterodyne application
[NASA-TP-1745] N80-33663

QUANTUM ELECTRODYNAMICS
Quantum field-theoretical electromagnetic and gravitational two-particle potentials N80-34275
Research in general physics, plasma dynamics, and communication sciences and engineering
[RLE-PR-122] N80-34338

QUANTUM THEORY
Theoretical aspects of the mechanism of simple chemical reactions
[AD-A088804] N80-33481
Selected studies in classical and quantum field theory N80-34274

QUARKS
High-energy proton-proton elastic scattering
N80-34236
Instantons and fermion densities N80-34273

QUARTZ CRYSTALS
Influence of the environmental conditions on a quartz resonator
[RAE-LIB-TRANS-1897(5207)] N80-33673
Frequency skipping in negative resistance oscillators with applications to crystal-controlled monolithic phase-locked loops N80-33677

QUASARS
Radio spectral characteristics of extragalactic objects N80-34333

QUASI-STEADY STATES
Prediction methods for unsteady separated flows
N80-33378

QUEUEING THEORY
Optimum systems design with random input and output applied to solar water heating N80-33854
Identification and analysis of simple models for the response time of complex computer systems
N80-34157

R

RADAR
Sodar network support for LIRAQ utilization in conjunction with project MABLE
[PB80-192909] N80-33977

RADAR ASTRONOMY
Planetary radar N80-33445

RADAR CROSS SECTIONS
On the application of the GTD-MM technique and its limitations
[AD-A088806] N80-33655

RADAR DETECTION
Radar waveform synthesis for target identification
[AD-A088673] N80-33660

RADAR IMAGERY
Able image chain analysis. Revision
[AD-A088853] N80-33651

RADAR MAPS
Able image chain analysis. Revision
[AD-A088853] N80-33651

RADAR SIGNATURES
Radar waveform synthesis for target identification
[AD-A088673] N80-33660

RADAR TARGETS
On the application of the GTD-MM technique and its limitations
[AD-A088808] N80-33655
Radar waveform synthesis for target identification
[AD-A089673] N80-33680
RADAR TRANSMISSION
Atmospheric/ionospheric/magnetospheric
h using the Chatanika radar
[AD-A088915] N80-34004
RADIANT FLUX DENSITY
Radiation-induced graft polymerization of styrene onto cellulose esters N80-33586
The minimum flux corona; theory or concept
[NASA-CR-163636] N80-34328
RADIANT HEATING
Solar heating system at Quitman County Bank, Marks, Mississippi
[NASA-CR-161549] N80-33858
Installation, operation, and maintenance for the pyramidal optics solar system installed at Yacht Cover, Columbia, South Carolina
[NASA-CR-161203] N80-33864
Development of a site-fabricated, building integrated air solar system
[ALO-4123-5] N80-33913
Tropical cyclone genesis: Numerical modeling inferences N80-34016
RADIATION ABSORPTION
Evaluation of specialized photoacoustic absorption chambers for Near Millimeter Wave (NMMW) propagation measurements
[AD-A088842] N80-33654
Absorption equilibrium of solar radiation between the two hemispheres of Earth
[INPE-1851-RPE/208] N80-33995
RADIATION DAMAGE
Radiation damage in high voltage silicon solar cells N80-33889
A comparison of solar array radiation damage models N80-33891
Solar cell modeling for computer-aided generator design and irradiation degradation computations N80-33896
RADIATION DOSAGE
Lesions to and recovery of mouse seminiferous epithelium after exposure to radiation at different dose rates N80-34079
RADIATION EFFECTS
CPSK, DPSK, and FSK demodulator performance under nuclear stressed conditions
[AD-A088364] N80-33685
The effects of laser radiation on pyrolytic silicon nitride coatings on slip-cast fused silica substrates
[AD-A089130] N80-33738
RADIATION HAZARDS
Low-level ionizing radiation
[GPO-50-084] N80-33964
Controlling hazardous wastes research summary
[PB80-194202] N80-33970
RADIATION MEASUREMENT
Pattern measurements of a low-sidelobe horn antenna N80-33429
Development of a technique for determining natural radioactivity using slow-speed aircraft at low altitudes
[INPE-1831-RPE/195] N80-33838
A precise measurement of the sidereal anisotropy of cosmic rays near 1500 GV N80-34336
Measurements of secondary cosmic radiation aboard a jet aircraft at altitudes of 12 and 12.5 km over Boa Vista and Campinas
[INPE-1808-RPE/176] N80-34337
RADIATION TOLERANCE
Thin, high efficiency silicon solar cells — 56 micrometers thick N80-33885
RADIATIVE HEAT TRANSFER
An accurate and computationally fast formulation for radiative fields and heat transfer in general, plane-parallel, non-grey media with antisotropic scattering N80-33713
RADIATIVE LIFETIME
Radiative capture studies of the electromagnetic decays of highly excited states
[DOE/ER-01388/443] N80-33667
RADIATIVE TRANSFER
Radiative transfer in one dimensional, discretely stratified media
[AD-A088885] N80-33653
Development of a soil moisture model for use with passive microwave remote sensors N80-33828
Determining the form factors of plane and cylindrical surfaces by numerical methods
[INPE-1815-RPE/183] N80-34185
RADIO ANTENNAS
Pattern measurements of a low-sidelobe horn antenna N80-33429
RADIO ASTRONOMY
The telecommunications and data acquisition report
[NASA-CR-163608] N80-33427
The table mountain 8-mm-wavelength interferometer N80-33428
IMP 8. Volume 1: EM field experiment
[NASA-CR-160023] N80-33450
IMP-8. Volume 2: Scientific section — Bibliography
[NASA-CR-160024] N80-33451
Voyager 1: Encounter with Saturn
[NASA-NEWS-RELEASE-80-159] N80-34324
Research in general physics, plasma dynamics, and communication sciences and engineering
[RLE-PR-122] N80-34338
RADIO COMMUNICATION
Almost-necessary conditions for a solar active region to produce a subsequent polar cap absorption event
[AD-A088882] N80-34003
Flow control and routing algorithms for data networks
[AD-A088767] N80-34159
RADIO EQUIPMENT
Installation of C-6533(XE-2)/ARC ICS in UH-1H helicopter
[AD-A088708] N80-33650
RADIO FREQUENCIES
A study of the processes in the RF hydrogen gas dissociator N80-33438
RADIO FREQUENCY HEATING
Effect of ICRF heating on single particle confinement in Tokamaks
[AD-A088578] N80-34261
RADIO FREQUENCY INTERFERENCE
Coding for spread spectrum packet radios
[NASA-CR-163628] N80-33639
Connector design techniques to avoid RFI
[AD-A088789] N80-33686
Almost-necessary conditions for a solar active region to produce a subsequent polar cap absorption event
[AD-A088882] N80-34003
RADIO INTERFEROMETERS
The telecommunications and data acquisition report
[NASA-CR-163608] N80-33427
The table mountain 8-mm-wavelength interferometer N80-33428
ORION S-band data acquisition for S-Y calibration — radio interferometer networks N80-33432
RADIO METEOROLOGY
Medium-scale study of a waving cold front
[BLL-TRANS-1453-(9022.549)] N80-34013
RADIO RECEIVERS
ORION S-band data acquisition for S-Y calibration — radio interferometer networks N80-33432
Open-loop radio science with a suppressed-carrier signal N80-33440
RADIO SIGNALS
Geomagnetic activity and the equatorial scintillation of satellite signals
[AD-A088848] N80-33652
RADIO SOURCES (ASTRONOMY)
Relativistic effects in extragalactic radio sources N80-34335
RADIO SPECTRA
Radio spectral characteristics of extragalactic objects N80-34333
RADIO TELESCOPES
The SETI instrument development plan N80-33430
A bimodal search strategy for SETI N80-33431
RADIO TRANSMISSION
Coding for spread spectrum packet radios
[NASA-CR-163628] N80-33639
RADIOACTIVE ISOTOPES
Testing iodized activated carbon filters with nonradioactive methyl iodide
[AD-A088666] N80-33522
Cosmic-ray produced radionuclides in extraterrestrial material — lunar samples, meteorites, and iron spherules in Pacific clay N80-34332
RADIOIMMUNOASSAY
Application of a computer programme for the determination of radioimmunological measured values
[BLL-RTS-12046] N80-34094
RADIOMETERS
Noise adding radiometer performance analysis N80-33441
High speed lookup table approach to radiometric calibration of multispectral image data
[NASA-TP-1741] N80-33483
RADIOSONDES
Medium-scale study of a waving cold front
[BLL-TRANS-1453-(9022.549)] N80-34013
RAIL TRANSPORTATION
Overview of escalator applications in rail transit
[NASA-CR-163633] N80-34296
RAIN
Relationship between short and long term rainfall rates and its implication for the design of radio links
[BLL-RDL-TRANS-3665-(7737.470)] N80-33643
Effect of downlink phased array patterns on system availability contour predictions
[AD-A088664] N80-33681
RAINDROPS
Techniques for examining drop size spectra in water sprays and clouds
[ARL/MECH-ENG-NOTE-375] N80-33721
Statistical classification of ice particles and raindrops by pattern recognition techniques N80-34021
RAINSTORMS
Structure, mechanism and prediction of orographically enhanced rain in Britain N80-33814
RAMAN SPECTRA
Some aspects of the nonlinear interaction of light and matter N80-34257
RAMAN SPECTROSCOPY
Effects of ultra-high pressures on methanol, ethanol, calcium oxide, rutile, cassiterite, and germanium dioxide N80-33515
RANDOM NOISE
Asymptotic analysis of linear filtering problems N80-34177
RANDOM PROCESSES
Nonstationary random response of structural systems to aerodynamic wind forces N80-33775
An investigation of type 1 error rate for approximate F tests of linear combinations of mean squares N80-34175
RANDOM VARIABLES
A first-order methodology for calculating probability of mission success
[AD-A088910] N80-34206
RANGE (EXTREMES)
A simple method for converting frequency domain aerodynamics to the time domain
[NASA-TM-81844] N80-33358
A one-pass method for counting range mean pair cycle for fatigue analysis
[ARL-STRUC-NOTE-454] N80-33781
RANGE AND RANGE RATE TRACKING
Advanced electro-optical tracker/ranger
[AD-A089143] N80-34254
RANGEFINDING
A 2.06 micron-laser rangefinder technology
[AD-A088836] N80-33737
Advanced electro-optical tracker/ranger
[AD-A089143] N80-34254
RANK TESTS
Strict chebyshev approximation of discrete data
[CSIR-TWISK-133] N80-34201
RANKINE CYCLE
Rankine bottoming cycle safety analysis
[DOE/ET-15445/T1] N80-33912
RAPID QUENCHING (METALLURGY)
Application of solidification theory to rapid solification processing
[AD-A089006] N80-33480
RARE GASES
Total and differential scattering cross section measurements for positrons and electrons colliding with inert gases N80-34227
RAREFIED GAS DYNAMICS
Molecular beam chemiluminescent investigation of the inelastic collisions of rare gas metastable atoms N80-34223

RAWINSONDES
Identifications and forecasting of the potential for the occurrence of extended-range VHF-UHF transhorizon propagation from synoptic-scale data N80-33630

RAY TRACING
Generalized ray tracing, generalized bending and use of caustic surfaces as merit functions in optical design N80-34247

RAYLEIGH SCATTERING
The extended Rayleigh theory of the oscillation of liquid droplets
[AD-A088894] N80-33724

REACTION KINETICS
Theoretical aspects of the mechanism of simple chemical reactions
[AD-A088804] N80-33481
Formation of organosilicon compounds. 58: Synthesis of a carbosilane with propellane structure
[RAE-LIB-TRANS-2029(5207)] N80-33483
Radiative capture studies of the electromagnetic decays of highly excited states
[DOE/ER-01398/443] N80-33867
Ion-ion neutralization
[AD-A090209] N80-34001
Kinetic and photochemical data for atmospheric chemistry reactions of the nitrogen oxides
[PB80-198799] N80-34009
Fixation of Zn(II) ions on metal oxide surfaces
[BLL-RTS-12200] N80-34262

REACTION TIME
Control of the recombination time in photoconductive detectors
[INPE-1814-RPE/182] N80-33681

REAL TIME OPERATION
Intercommunications in real time, redundant, distributed computer system
[NASA-CR-163604] N80-33642
A multi-site magnetotelluric measurement system with real time data analysis N80-33988

REAL VARIABLES
Non-quadratic nomography, chapter 2
[BLL-RTS-12290] N80-34166

RECOMBINATION COEFFICIENT
Control of the recombination time in photoconductive detectors
[INPE-1814-RPE/182] N80-33681

RECORDING INSTRUMENTS
Helicopter flight test instrumentation
[AGARD-AG-160-VOL-10] N80-33406

RECTENNAS
Satellite Power Systems (SPS) concept definition study. Volume 2, part 2: System engineering — cost and programmatics
[NASA-CR-3219] N80-33869

RED GIANT STARS
A study of the 10830 A line of neutral helium in the spectra of red giants N80-34303

RED SHIFT
WQ 2059-247: An unusual high redshift X-ray cluster
[NASA-CR-163619] N80-34307

REDUNDANT COMPONENTS
The probability of survival of redundant systems under a static load N80-34199

REFLECTANCE
An improved six-port technique for measuring complex reflection coefficient N80-34249

REFLECTED WAVES
Selective reflection of light at a solid-gas interface and its application N80-34244

REFLECTOMETERS
Experimental optical fiber communications link N80-33439

REFLECTORS
A parametric analysis of performance characteristics of satellite-borne multiple-beam antennas
[NASA-CR-163632] N80-33841
An evaluation of spectrally selective reflectors (cold mirror membranes) for use with concentrator solar arrays N80-33800

REFRACTORY MATERIALS
Polyimides: Thermally stable aerospace polymers
[NASA-TM-81984] N80-33571

REFRIGERANTS
The solution cycle in an absorption system with pressure equalising gas (theoretical and experimental investigations)
[BLL-RTS-12307] N80-33608

REGENERATION (ENGINEERING)
Regenerations of critical process solutions relative to recoveries of valuable substances
[BLL-RTS-12141] N80-33505
Analysis of Markov renewal processes with some nonregeneration points and their applications to reliability theory N80-33753

REGENERATIVE FUEL CELLS
Electrochemical Orbital Energy Storage (ECOES) technology program — regenerative fuel cell system N80-33473

REGOLITH
Carbonate formation on Mars — environment simulation N80-34314

REGRESSION ANALYSIS
Regression modeling of turbine engine performance
[AD-A088898] N80-33411
Site index prediction tables for oak in northwestern West Virginia
[PB80-189830] N80-33852
Identification and analysis of simple models for the response time of complex computer systems N80-34157
A cusum for a scale parameter — applications to quality control and regression analysis
[CSIR-TWISK-130] N80-34186

REINFORCING FIBERS
Evaluation of amorphous ribbon reinforced resin matrix composites
[AD-A089102] N80-33501

RELATIVISTIC EFFECTS
Relativistic effects in extragalactic radio sources N80-34335

RELATIVISTIC ELECTRON BEAMS
Steady state treatment of relativistic electron beam erosion
[AD-A089047] N80-34237

RELATIVITY
Four lectures on Poincare gauge field theory
[ORO-3992-260] N80-34279

RELAXATION METHOD (MATHEMATICS)
On the convergence of a block successive overrelaxation method for a class of linear complementarity problems
[AD-A088760] N80-34154

RELAXATION TIME
Oxygen and nitrogen nuclear magnetic resonance studies of amides and aromatic aldehydes and ketones N80-33514

RELIABILITY
Analysis of Markov renewal processes with some nonregeneration points and their applications to reliability theory N80-33753

REMOTE CONTROL
Computer-supported access systems in space flight
[DFVLR-MITT-78-02] N80-34115

REMOTE SENSORS
Application of thematic mapping techniques in terrain analysis
[AD-A089061] N80-33847
Interactive digital image processing investigation, phase 2
[AD-A087518] N80-33848
In situ ozone data for evaluation of the laser absorption spectrometer ozone remote sensor: 1979 southeastern Virginia urban plume study summer field program
[NASA-TM-81831] N80-33929
Operational remote sensing legislation, part 1
[GPO-45-048] N80-34294
Operational remote sensing legislation, part 2
[GPO-52-581] N80-34295

REMOTELY PILOTED VEHICLES
Nickel-zinc batteries for RPV applications
[AD-A088584] N80-33908

RENAL FUNCTION
Morphological study of rat kidneys after flight aboard the Cosmos-936 biosatellite N80-34065

RENDEZVOUS GUIDANCE
Shuttle OFT Level C navigation requirements
[NASA-TM-8221] N80-33457

REPLICAS
Self-replicating systems: A systems engineering approach
[NASA-TM-78304] N80-34209

REPORT GENERATORS
Users' guide for the tabular display report generator program (TABDIS)
[NASA-TM-82211] N80-34146

RESEARCH AIRCRAFT
The oblique wing-research aircraft N80-33338

RESEARCH AND DEVELOPMENT
Management guidance for research climate N80-34260

RESEARCH MANAGEMENT
The use of PROINF in the research project EBOSIPES — project information system
[DFVLR-MITT-78-02] N80-34124

RESIDENTIAL ENERGY
Design package for solar domestic hot water system
[NASA-CR-161558] N80-33867
Low-cost flywheel demonstration program
[CONS-5085-T2] N80-33909

RESIDUAL GAS
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 2: Residual-fired nocogeneration process boiler
[NASA-CR-159770-PT-2] N80-33861

RESIDUAL STRESS
Fatigue testing of vampire wings
[ARL/STRUC-REPT-378] N80-33399
The deposition of palladium coatings with low hydrogen content and stress in sulphuric acid electrolyte
[BLL-RTS-12267] N80-33534
Analysis of residual stresses resulting from cold rolling of notches and their effect on fatigue behavior
[AD-A089110] N80-33807

RESOLUTION CELL
Impact of cell size on inventory and mapping errors in a cellular geographic information system
[E80-10315] N80-33831

RESONANCE
Experimental electron-impact excitation and ionization of positive ions N80-34226

RESONANCE FLUORESCENCE
Laser excited nonresonant fluorescence spectroscopy
[ATR-80(7783)-1] N80-33523

RESONANT FREQUENCIES
IBIG standard for pulse repetition frequencies and reference oscillator frequency for C-band radars
[AD-A088545] N80-33696
Frequency skipping in negative resistance oscillators with applications to crystal-controlled monolithic phase-locked loops N80-33677

RESONATORS
Influence of the environmental conditions on a quartz resonator
[RAE-LIB-TRANS-1897(5207)] N80-33673

RESPIRATORY SYSTEM
Cardiorespiratory system reactions of cosmonauts to exercise following long-term missions aboard the Salyut 6 orbital station N80-34060
Preflight distinctions of Staphylococcus aureus carriers among cosmonauts N80-34062

RETENTION (PSYCHOLOGY)
Effects of transmeridional flights and highland conditions on different forms of memory N80-34068

RETRACTABLE EQUIPMENT
Design and technology of solar arrays for shuttle launched missions N80-33883

RETROREFLECTION
Photometry and colorimetry of retroreflection: State-of-measurement-accuracy report
[PB80-201783] N80-34256

REUSABLE ROCKET ENGINES
Space shuttle solid rocket booster retrieval system: Five NOSC papers on space shuttle support
[AD-A089060] N80-33458

REYNOLDS NUMBER
Viscous flow near a sphere under surface gravity waves N80-33701

REYNOLDS STRESS
Transonic shock wave - boundary layer interactions
[AD-A088831] N80-33359

RHYTHM (BIOLOGY)
Data handling in the medical experiment of the Spacelab Preparatory Program ASSESS 2
[DFVLR-MITT-78-02] N80-34114

RICCATI EQUATION
Asymptotic analysis of linear filtering problems N80-34177
Structures and algorithms in stochastic realization theory and the smoothing problem [AD-A086465] N80-34192
RIGID STRUCTURES
Inelastic response of an infinite cylindrical shell to a transient acoustic wave [AD-A089597] N80-33808
RING STRUCTURES
Ring element dynamic stresses N80-33786
Elastic-plastic analysis using a triangular ring element in NASTRAN N80-33793
RINGS (MATHEMATICS)
Torsion theory and modules of finite length N80-34173
RISERS
Analysis of in-line flow-induced vibrations using linearization methods N80-33710
RISK
Experimental and analytical studies for the NASA carbon fiber risk assessment [NASA-CR-159214] N80-33490
RIT ENGINES
Employment of a digital computer in the tests to ascertain the useful life of the thruster RIT 10 [DFVLR-MITT-79-02] N80-34125
RIVER BASINS
Evaluation of hydropower potential in a river basin — Prediction analysis technique N80-33856
RIVERS
A quantitative evaluation of LANDSAT for monitoring suspended sediments in a fluvial channel N80-33823
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland [E80-10228] N80-33829
ROBOTS
A linear photodiode array employed in a short range laser triangulation obstacle avoidance sensor — Martian roving vehicle sensor [NASA-CR-163613] N80-33747
Self-replicating systems: A systems engineering approach [NASA-TM-78304] N80-34209
ROCKET LAUNCHING
Launch mission summary and terminal countdown, Delta 153 Satellite Business Systems satellite (SBS-A) [NASA-TM-82212] N80-33455
ROCKET NOZZLES
Flows in the annular region when an underexpanded nozzle is exhausted into a stepped launch tube [AD-A088581] N80-33477
ROCKY MOUNTAINS (NORTH AMERICA)
Mountain waves and momentum flux N80-33815
ROLLER BEARINGS
Effect of cage design on characteristics of high-speed-jet-lubricated 35-millimeter-bore ball bearing — turbojet engines [NASA-TP-1732] N80-33749
ROSSBY REGIMES
Planetary waves: Theory and observation — extratropical waves N80-33813
Effects of bottom topography on ocean currents N80-33817
ROTARY WINGS
Comparison of calculated and measured helicopter rotor lateral flapping angles [NASA-TM-81213] N80-33349
Unsteady flows associated with helicopter rotors N80-33370
Validation of the rotorcraft flight simulation program (C81) using operational loads survey flight test data [AD-A089008] N80-33422
Stability of nonuniform rotor blades in hover using a mixed formulation [NASA-TM-81226] N80-33777
An evaluation of a computer code based on linear acoustic theory for predicting helicopter main rotor noise — CH-53A and S-76 helicopters [NASA-CR-159339] N80-34217
ROTATING ELECTRICAL MACHINES
Bearing And Power Transfer Assembly (BAPTA) with rotary transformer N80-33902
ROTATING FLUIDS
Laboratory studies of topographic effects in rotating and/or stratified fluids N80-33819
ROTOR AERODYNAMICS
Analysis and correlation of test data from an advanced technology rotor system — helicopter performance prediction [NASA-CR-152366] N80-33351
Calculation of three-dimensional unsteady transonic flows past helicopter blades [NASA-TP-1721] N80-33356
Validation of the rotorcraft flight simulation program (C81) using operational loads survey flight test data [AD-A089008] N80-33422
The aerodynamics of contra-rotating axial flow wind power turbines [CSIR-ME-1638] N80-33868
ROTOR BLADES (TURBOMACHINERY)
High bypass turbofan component development. Amendment 1: Small fan redesign [AD-A089067] N80-33413
ROTORS
A modeling technique for design and simulation of hydrostatic journal bearings N80-33745
ROVING VEHICLES
A linear photodiode array employed in a short range laser triangulation obstacle avoidance sensor — Martian roving vehicle sensor [NASA-CR-163613] N80-33747
RUNWAYS
Test and evaluation of Texas Instruments small community microwave landing system [AD-A088852] N80-33387

S

SAFETY
Rankine bottoming cycle safety analysis [DOE/ET-15445/T1] N80-33912
SAFETY DEVICES
Aviation safety: DC-10 crash of May 25, 1979 [GPO-54-572] N80-33383
SALINITY
Experimental studies of setting standard for optimun salt composition of portable water N80-34077
SAMPLES
Estimation of the population total when the sample is taken from a list containing an unknown amount of duplication N80-34198
SAMPLING
Ground water monitoring strategies to support community management of on-site home sewage disposal systems N80-33826
Development and validation of methods for sampling and analysis of workplace toxic substances [PB80-194574] N80-34095
A unit stratifications sample design using rotational sampling N80-34178
SAN JUAN MOUNTAINS (CO)
A multi-step method for avalanche zone recognition and analysis — San Juan Mountains (co) N80-33824
SANDS
Enhancement of thermal energy transport through granular media N80-33702
SATELLITE ANTENNAS
A parametric analysis of performance characteristics of satellite-borne multiple-beam antennas [NASA-CR-163632] N80-33641
SATELLITE CONFIGURATIONS
Launch mission summary: FLTSATCOM-D Atlas/Centaur-57 [NASA-TM-82213] N80-33452
SATELLITE CONTROL
Contributions to the symposium: Computer Science in Space Flight — conference proceedings, Oberpfaffenhofen, West Germany, 19 Jan. 1978 [ESA-TT-587] N80-34112
Problems of autonomous airborne satellite control systems [DFVLR-MITT-78-02] N80-34119
SATELLITE DRAG
Determination and maintenance of Earth orbits with arcs of minimum altitude variation N80-33447
Drag-free estimation feasibility study [NASA-CR-163635] N80-33454
SATELLITE NETWORKS
Satnet development and operation. Pluribus satellite IMP development. Remote site maintenance. Internet development. Mobile Access Terminal Network, TCP for the HP 3000, TCP - TAC [AD-A089025] N80-33458
SATELLITE OBSERVATION
The United States space observation policy [NASA-TM-76373] N80-33425
Meteor and remote sensing satellites (a collection of articles) [NASA-TM-76369] N80-33453
Orographic effects revealed by satellite pictures: Mesoscale flow phenomena N80-33820
Private sector involvement in civil space remote sensing. Volume 1: Report [NASA-TM-82206] N80-33845
Private sector involvement in civil space remote sensing. Volume 2: Appendices [NASA-TM-82207] N80-33846
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 1: Optical auroral images and related direct measurements [NASA-TM-81121] N80-33997
Operational remote sensing legislation, part 1 [GPO-45-048] N80-34294
Operational remote sensing legislation, part 2 [GPO-52-581] N80-34295
SATELLITE ORBITS
Geometry of an antenna positioner for geostationary satellites [INPE-1795-NTE/161] N80-33648
SATELLITE POWER TRANSMISSION (TO EARTH)
Satellite power systems: Status and planned activities N80-33904
SATELLITE SOLAR ENERGY CONVERSION
Satellite power systems: Status and planned activities N80-33904
SATELLITE TRANSMISSION
Geomagnetic activity and the equatorial scintillation of satellite signals [AD-A088848] N80-33652
CPSK, DPSK, and FSK demodulator performance under nuclear stressed conditions [AD-A088364] N80-33685
SATURN (PLANET)
Saturn: Origin and composition of its inner moons and rings [NASA-CR-163630] N80-34320
Voyager 1: Encounter with Saturn [NASA-NEWS-RELEASE-80-159] N80-34324
SATURN PROJECT
Mission operation report: Voyager program Voyager 1 encounter at Saturn November 12, 1980 [NASA-TM-82217] N80-33426
SATURN RINGS
Saturn: Origin and composition of its inner moons and rings [NASA-CR-163630] N80-34320
SAWTOOTH WAVEFORMS
The stability of planar dynamical systems linear-in-cones [CSIR-TWISK-137] N80-34212
SCALE (RATIO)
A cusum for a scale parameter — applications to quality control and regression analysis [CSIR-TWISK-130] N80-34186
SCALE MODELS
Similitude modeling of natural convection heat transfer through an aperture in passive solar heated buildings [LA-8385-T] N80-33726
SCALING LAWS
Determining the three-dimensional motion and model of objects from a sequence of images N80-34136
SCANNING
Local response of ITO/polysilicon solar cells N80-33865
SCATTERING CROSS SECTIONS
Total and differential scattering cross section measurements for positrons and electrons colliding with inert gases N80-34227
SCATTERING FUNCTIONS
An accurate and computationally fast formulation for radiative fields and heat transfer in general, plane-parallel, non-grey media with anisotropic scattering N80-33713

SCENE ANALYSIS
A model of plant canopy polarization response
[E80-10336] N80-33605
SCHEDULING
Evaluation of precedence criteria for project scheduling under resource constraints
[AD-A089070] N80-34382
SCHLIEREN PHOTOGRAPHY
Flow visualization study of the F-14 fighter aircraft configuration
[NASA-CR-163089] N80-33350
Quantitative schlieren analysis of acoustic interaction with submerged plates
[AD-A089096] N80-34221
SCHMIDT TELESCOPES
A deep near-infrared objective-prism survey for carbon stars toward the galactic center and anticenter N80-34305
SCINTILLATION
Geomagnetic activity and the equatorial scintillation of satellite signals
[AD-A088946] N80-33652
Propagation modeling and evaluation of communication system performance in nuclear environments
[AD-A088914] N80-33684
SCRUBBERS
Progress with a new velocity electric precipitator the Electro-Dynamic Venturo (EDV) N80-33941
SEA BREEZE
A numerical simulation of the influence of heat and moisture fluxes upon mesoscale circulations N80-34015
SEA ROUGHNESS
Ocean wave sensing. Citations from the NTIS data base
[PB80-812878] N80-34053
SEA STATES
Low frequency sea level variability along the west coast of North America N80-34046
Ocean wave sensing. Citations from the NTIS data base
[PB80-812878] N80-34053
SEALERS
Dynamic evaluation of experimental integral fuel-tank sealants, part 1
[AD-A088573] N80-33573
SEAMOUNTS
Effects of bottom topography on ocean currents N80-33817
SEARCH RADAR
Spectrum resource assessment in the 2.7 to 2.9 GHz band. Phase 2: LSR deployment in the Los Angeles and San Francisco areas
[PB80-194467] N80-33391
SEASONS
Circulation seasons in the Northern Hemisphere and the changes in their duration in the twentieth century
[BLL-TRANS-1455-(9022.549)] N80-34014
SECONDARY COSMIC RAYS
Measurements of secondary cosmic radiation aboard a jet aircraft at altitudes of 12 and 12.5 km over Boa Vista and Campinas
[INPE-1808-RPE/176] N80-34337
SEDIMENT TRANSPORT
A quantitative evaluation of LANDSAT for monitoring suspended sediments in a fluvial channel N80-33823
A three dimensional finite difference model of the transport of suspended sediment
[CSIR-RR-359] N80-33962
Assessment of the role of remote sensing in the study of inland and coastal waters
[NASA-TM-81861] N80-34048
SEDIMENTS
Assessment of seabed seismic systems
[PB80-195985] N80-34010
Properties of the oceans reflected in the sea-bed distribution of quaternary planktonic Foraminifera: Including a study of the limits of empirical Paleo-Oceanographic models and the recognition and interpretation of faunal assemblages lacking modern counterparts N80-34047
SEISMIC ENERGY
An enhancement of NASTRAN for the seismic analysis of structures — nuclear power plants N80-33787
Energy programs at the John Hopkins University Applied Physics Laboratory
[PB80-195316] N80-33919
Seismic stress relaxation phenomena in an inhomogeneously prestressed medium N80-33983
SEISMIC WAVES
Assessment of seabed seismic systems
[PB80-195985] N80-34010
Solar-terrestrial predictions proceedings. Volume 4: Prediction of terrestrial effects of solar activity
[PB80-200025] N80-34011
SEISMOGRAMS
Seismic stress relaxation phenomena in an inhomogeneously prestressed medium N80-33983
SEISMOLOGY
Fundamentals studies in geodynamics
[NASA-CR-163620] N80-33980
SELF ADAPTIVE CONTROL SYSTEMS
Problems of autonomous airborne satellite control systems
[DFVLR-MITT-78-02] N80-34119
SELF LUBRICATING MATERIALS
Method of making bearing material
[NASA-CASE-LEW-11930-3] N80-33482
SEMICONDUCTING FILMS
Control of the recombination time in photoconductive detectors
[INPE-1814-RPE/182] N80-33681
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/1] N80-33914
SEMICONDUCTOR DIODES
The solar cell blanket design for space telescope's roll-out solar array N80-33874
Diodes for space solar arrays — 200 micrometers thick N80-33887
SEMICONDUCTOR LASERS
Mode structure of Al sub xGa sub 1-xAs injection lasers N80-33733
SEMICONDUCTORS (MATERIALS)
Characterization and theory of electrolyte-insulator-semiconductor field-effect transistor N80-33678
Two approaches towards a low power solid state laser N80-33734
Ion implantation of wide bandgap semiconductors
[AD-A089026] N80-34258
Research in general physics, plasma dynamics, and communication sciences and engineering
[RLE-PR-122] N80-34338
SENSITIVITY
A sensitivity analysis of volcanic aerosol dispersion in the stratosphere — Mt. Fuego, Guatemala eruptions
[NASA-CR-163606] N80-33926
SENSORIMOTOR PERFORMANCE
Distinctions of pilot motor activity in different piloting modes during landing approaches N80-34070
SEPARATED FLOW
Transonic shock wave - boundary layer interactions
[AD-A088831] N80-33359
Prediction methods for unsteady separated flows N80-33376
The theory of two dimensional separated flows
[RAE-LIB-TRANS-2002] N80-33697
SEPARATORS
Status of nickel-hydrogen cell technology N80-33474
Vapors-liquid phase separator — infrared telescope heat sink
[NASA-CR-163621] N80-33717
SERVICE LIFE
Process modifications for improved carbon fiber composites: Alleviation of the electrical hazards problem
[NASA-CR-163631] N80-33494
Special engineering services to establish inspection criteria for bearings to improve life prediciton
[AD-A088765] N80-33754
Battery electrolytes. Citations from the NTIS data base
[PB80-808629] N80-33915
Battery electrolytes. Citations from the Engineering Index data base
[PB80-808637] N80-33916
SET THEORY
Generalized addition sets N80-34171
On the asymptotic analysis of Griffiths' period mapping N80-34174
SEWAGE
Ground water monitoring strategies to support community management of on-site home sewage disposal systems N80-33826
Assessment of alternative strategies for sludge disposal into deep ocean basins off southern California
[PB80-192990] N80-33871
SEX FACTOR
Differences in certain physiological, biomechanical, and subjective measures of work effect between males and females while backpacking N80-34089
SHAFTS (MACHINE ELEMENTS)
Effect of cage design on characteristics of high-speed-jet-lubricated 35-millimeter-bore ball bearing — turbojet engines
[NASA-TP-1732] N80-33749
SHAPES
A study of human throat-wall and vocal tract from input/output measurements N80-34091
Geologic implications of regional scale variation in lunar crater shape. Fourier crater shape analysis N80-34312
SHEAR FLOW
Experimental investigations of the transport properties of flow suspensions. 1: Measurement of velocity distributions of suspension flows in a rectangular channel. 2: Experimental study of the effective thermal conductivity in shear flow of a suspension. 3: The use of fluorescence correlation spectroscopy to measure molecular diffusion and velocity distributions N80-33711
SHEAR PROPERTIES
On Irwins and Achenbachs expressions for the energy release rate
[AD-A089118] N80-33803
SHEAR STRENGTH
Influence of stress interaction on the behavior of off-axis unidirectional composites
[NASA-CR-163616] N80-33495
SHIPS
New capacities and modifications for NASTRAN level 17.5 at DTNSRDC N80-33783
SHOCK LOADS
Uncoupling approximation in fluid-structure interaction problems with cavitation
[AD-A088911] N80-33725
SHOCK WAVES
Transonic shock wave - boundary layer interactions
[AD-A088831] N80-33359
On the comet model of Biermann et al
[INPE-1805-RPE/173] N80-34323
SHORELINES
Wave information study for United States coastlines. Report 1: Surface pressure field reconstruction for wave hindcasting purposes
[AD-A089150] N80-34029
SHORT HAUL AIRCRAFT
Application of advanced technologies to small, short-haul air transports
[NASA-CR-152364] N80-33396
SIDELOBES
Pattern measurements of a low-sidelobe horn antenna N80-33429
SIGNAL ENCODING
Interfield hybrid coding of NTSC component video signals N80-33636
SIGNAL FADING
Syncompex: A voice processing system for low cost HF radio telephony
[CRC-1316-E] N80-33648
SIGNAL GENERATORS
The 1979 towed source experiment signal generator
[AD-A088757] N80-33659
SIGNAL PROCESSING
Alternatives for the development of future television systems
[BLL-RTS-12332] N80-33626
Two dimensional smoothing of a vector Laplacian random field with application to geodesy N80-33982
Research in aeronomy
[NASA-CR-163610] N80-33996
SIGNAL STABILIZATION
A fiber optic transmission line stabilization apparatus and method
[NASA-CASE-NPO-15006-1] N80-34250

SIGNAL TO NOISE RATIOS
Noise adding radiometer performance analysis
N80-33441

SIGNAL TRANSMISSION
Omega navigation system. Citations from the NTIS data base
[PB80-812712] N80-33390
Open-loop radio science with a suppressed-carrier signal N80-33440
Methods of digital speech signal transmission
[BLL-RDL-TRANS-3798-(7737.470)] N80-33622

SILANES
Formation of organosilicon compounds. 58: Synthesis of a carbosilane with propellane structure
[RAE-LIB-TRANS-2029(5207)] N80-33483

SILICA GLASS
The action of water vapour on ion irradiated alkali silicate glasses
[AD-A089023] N80-33572

SILICON
Study of high field effects in metal-aluminum oxide-silicon capacitors N80-33676
Thin, high efficiency silicon solar cells — 56 micrometers thick N80-33885
Qualification test results of the production high efficiency K6-3/4 and K7 silicon solar cells
N80-33886
Radiation damage in high voltage silicon solar cells N80-33889
Comparison of silicon solar cell characteristics at operating temperature after electron irradiation
N80-33890
The influence on the front metal coverage factor on the open-circuit voltage of silicon solar cells
N80-33892
Studies of indium-doped silicon — infrared detector development
[AD-A088736] N80-34269

SILICON ALLOYS
Silicon germanium alloys for infrared detectors
[AD-A088732] N80-33502
Control of solidification structures and properties of industrial Al-Si alloys
[BLL-RTS-11916] N80-33544

SILICON CARBIDES
The mechanical pretreatment of printed circuit boards
[BLL-RTS-12263] N80-33671

SILICON DIOXIDE
Frosted solar cell covers — optical properties
N80-33877

SILICON FILMS
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/1] N80-33914

SILICON NITRIDES
The effects of laser radiation on pyrolytic silicon nitride coatings on slip-cast fused silica substrates
[AD-A089130] N80-33738

SILVER
Selective electroplating processes
[BLL-RTS-11960] N80-33506
Investigations into the distribution of the layer thickness produced by barrel electroplating in the case of cyanic silver plating
[BLL-RTS-12204] N80-33538

SIMULATION
Real-time telephone traffic simulation using learning automata routing
[S/IS-7909] N80-34148
Simulation study of telephone traffic routing using learning algorithms, part 2
[S/IS-7907-PT-2] N80-34149

SINGLE CRYSTALS
The epitaxial polymerization of (SN)x N80-34264

SINGULARITY (MATHEMATICS)
Applications of non-self-adjoint operator theory to the Singularity Expansion Method (SEM) and the Eigenmode Expansion Method (EEM) in acoustic and electromagnetic problems
[AD-A088747] N80-34191

SINTERING
The fluidized bed gasification of coal char
[BLL-RTS-12346] N80-33576

SLENDER WINGS
On the swelling of rolled up vortex surfaces and the breakdown of the vortex core for slender wings
[NASA-TM-75862] N80-33346

SLUDGE
Assessment of alternative strategies for sludge disposal into deep ocean basins off southern California
[PB80-192990] N80-33971

SMS 2
Algorithm for extracting data from meteorological satellites for use in estimating precipitation
[INPE-1769-RPE/155] N80-34026

SOCIOLOGY
Technology Assessment. Citations from the NTIS data base
[PB80-813165] N80-34299
Technology Assessment. Citations from the NTIS data base
[PB80-813173] N80-34300

SODIUM HYDRIDES
Chemical nickel-plating with sodium borohydride. Process technology and properties of coats
[BLL-RTS-12156] N80-33532

SOIL MOISTURE
Development of a soil moisture model for use with passive microwave remote sensors N80-33828
Defining relationships between surface characteristics and actual evaporation rate
[E80-10335] N80-33834
The use of radiation temperature to detect water-stress in sugarcane crop — Brazil
[INPE-1767-TDL/028] N80-33839
A numerical simulation of the influence of heat and moisture fluxes upon mesoscale circulations
N80-34015

SOILS
Thermal balance of soils
[INPE-1859-RPE/210] N80-33841

SOLAR ACTIVITY
Almost-necessary conditions for a solar active region to produce a subsequent polar cap absorption event
[AD-A088882] N80-34003

SOLAR ACTIVITY EFFECTS
Solar-terrestrial predictions proceedings. Volume 4: Prediction of terrestrial effects of solar activity
[PB80-200025] N80-34011
Sun Series program for the REEDA System — predicting orbital lifetime using sunspot values
[NASA-CR-161579] N80-34327

SOLAR ARRAYS
Large solar arrays N80-33471
Electrochemical Orbital Energy Storage (ECOES) technology program — regenerative fuel cell system
N80-33473
The solar cell blanket design for space telescope's roll-out solar array N80-33874
Ultrathin cell module technology — silicon
N80-33876
Study of the internal mechanics of space photovoltaic generators N80-33878
The ECS solar array N80-33879
SPOT solar array — for a three axis stabilized heliosynchronous satellite in an 800 km orbit
N80-33880
Telescopic masts for deployment of flexible solar arrays N80-33881
Potential use of terrestrial photovoltaics for future space solar arrays N80-33882
Design and technology of solar arrays for shuttle launched missions N80-33883
Diodes for space solar arrays — 200 micrometers thick N80-33887
A comparison of solar array radiation damage models N80-33891
On the design verification of large flexible solar arrays: First experiences gained N80-33897
Efficient thermal cycling of solar panels in solar simulation facilities with a multi-panel test rig
N80-33898
A general purpose computer program to assist in the system design of a solar array N80-33899
An evaluation of spectrally selective reflectors (cold mirror membranes) for use with concentrator solar arrays N80-33900
Properties of solar generators with reflectors and radiators — in a space environment N80-33901
Technology of elevated voltage solar arrays — 250 kW N80-33903

SOLAR ATMOSPHERE
Mesogranulation and supergranulation in the Sun
N80-34325

SOLAR BLANKETS
Manufacturing of space telescope solar array blankets N80-33875
Design and technology of solar arrays for shuttle launched missions N80-33883
On the design verification of large flexible solar arrays: First experiences gained N80-33897

SOLAR CELLS
Air Force space power technology program
N80-33488
Photovoltaic technology development for synchronous orbit N80-33479
Electrochemically deposited cadmium telluride films and their application to solar cells N80-33853
Local response of ITO/polysilicon solar cells
N80-33855
Characterization of three types of silicon solar cells for SEPS Deep Space Mission. Volume 3: Current-voltage characteristics of spectrolab sculptured BSR/P+ (K7), BSR/P+ (K6.5) and BSR (K4.5) cells as a function of temperature and intensity
[NASA-TM-78305] N80-33863
Ultrathin cell module technology — silicon
N80-33876
Frosted solar cell covers — optical properties
N80-33877
Study of the internal mechanics of space photovoltaic generators N80-33878
Potential use of terrestrial photovoltaics for future space solar arrays N80-33882
Aspects of large area and thin silicon solar cell technologies N80-33884
Thin, high efficiency silicon solar cells — 56 micrometers thick N80-33885
Qualification test results of the production high efficiency K6-3/4 and K7 silicon solar cells
N80-33886
Development of space-qualified GaAs solar cells
N80-33888
Radiation damage in high voltage silicon solar cells N80-33889
Comparison of silicon solar cell characteristics at operating temperature after electron irradiation
N80-33890
The influence on the front metal coverage factor on the open-circuit voltage of silicon solar cells
N80-33892
Impact of terrestrial solar cell development on space applications N80-33893
Calibration of photovoltaic solar elements
N80-33894
Performance of the solar cell experiment on the NTS-2 satellite — navigation technology satellite
N80-33895
Solar cell modeling for computer-aided generator design and irradiation degradation computations
N80-33896
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/1] N80-33914

SOLAR COLLECTORS
Optimum systems design with random input and output applied to solar water heating N80-33854
Design data brochure for a pyramidal optical solar system
[NASA-CR-161202] N80-33865
Installation package for a sunspot cascade solar water heating system
[NASA-CR-161562] N80-33866
Design package for solar domestic hot water system
[NASA-CR-161558] N80-33867
Cleaning agents and techniques for concentrating solar collectors
[SAND-79-7052] N80-33911

SOLAR CORONA
Computer assisted performance tests of the Lyman Alpha Coronagraph
[NASA-CR-163622] N80-33482
The minimum flux corona; theory or concept
[NASA-CR-163536] N80-34328
Extreme ultra-violet emission from coronal structures
[AD-A087803] N80-34329
Coronal heating by stochastic magnetic pumping
[NASA-CR-163637] N80-34330

SOLAR CYCLES
Statistical relation between the solar cycle and drought in northeast Brazil
[INPE-1839-RPE/200] N80-34024
SOLAR ENERGY
Oversight: Wind energy program
[GPO-61-382] N80-33872
Comprehensive planning for passive solar architectural retrofit
[AD-A088880] N80-33907
Conservation and solar energy programs of the Department of Energy: A critique
[PB80-187739] N80-33922
The use of solar energy for cooking N80-33953
SOLAR FLARES
Almost-necessary conditions for a solar active region to produce a subsequent polar cap absorption event
[AD-A088882] N80-34003
Solar terrestrial physics services and publications 1980
[PB80-199136] N80-34012
SOLAR FLUX DENSITY
The minimum flux corona; theory or concept
[NASA-CR-163826] N80-34328
SOLAR HEATING
Similitude modeling of natural convection heat transfer through an aperture in passive solar heated buildings
[LA-8365-T] N80-33726
Optimum systems design with random input and output applied to solar water heating N80-33854
Solar heating system at Quitman County Bank, Marks, Mississippi
[NASA-CR-161549] N80-33858
Installation, operation, and maintenance for the pyramidal optics solar system installed at Yacht Cover, Columbia, South Carolina
[NASA-CR-161203] N80-33864
Design data brochure for a pyramidal optical solar system
[NASA-CR-161202] N80-33865
Installation package for a sunspot cascade solar water heating system
[NASA-CR-161562] N80-33866
Design package for solar domestic hot water system
[NASA-CR-161558] N80-33867
Comprehensive planning for passive solar architectural retrofit
[AD-A088880] N80-33907
Development of a site-fabricated, building integrated air solar system
[ALO-4123-5] N80-33913
SOLAR OSCILLATIONS
Theoretical studies of solar oscillations
[NASA-CR-163611] N80-34326
SOLAR PHYSICS
Solar terrestrial physics services and publications 1980
[PB80-199136] N80-34012
SOLAR POWER SATELLITES
Satellite Power Systems (SPS) concept definition study. Volume 2, part 2: System engineering — cost and programmatics
[NASA-CR-3319] N80-33869
SOLAR PROBES
International solar polar mission N80-33437
Drag-free estimation feasibility study
[NASA-CR-163635] N80-33454
SOLAR RADIATION
Absorption equilibrium of solar radiation between the two hemispheres of Earth
[INPE-1851-RPE/208] N80-33995
Research in aeronomy
[NASA-CR-163610] N80-33996
Proceedings of the NATO Advanced Study Institute on Atmospheric Ozone and its variation and human influences
[AD-A088869] N80-34006
SOLAR REFLECTORS
Properties of solar generators with reflectors and radiators — in a space environment N80-33901
SOLAR SIMULATION
Calibration of photovoltaic solar elements N80-33894
SOLAR SYSTEM
A bibliography of planetary geology principal investigators and their associates, 1979 - 1980
[NASA-TM-82190] N80-34301
SOLAR TERRESTRIAL INTERACTIONS
Statistical relation between the solar cycle and drought in northeast Brazil
[INPE-1839-RPE/200] N80-34024
SOLAR VELOCITY
Mesogranulation and supergranulation in the Sun N80-34325
SOLAR WIND
IMP-8. Volume 2: Scientific section — Bibliography
[NASA-CR-160024] N80-33451
On the comet model of Biermann et al
[INPE-1805-RPE/173] N80-34323
SOLAR WIND VELOCITY
Correlation of high latitude coronal holes with solar wind streams high above or below the ecliptic
[AD-A087525] N80-34331
SOLID PHASES
Ion-beam-induced modifications of thin film structures and formation of metastable phases N80-34265
SOLID PROPELLANTS
Experimental determination of the admittances of solid propellants by the impedance tube technique N80-33464
SOLID STATE
Ion-beam-induced modifications of thin film structures and formation of metastable phases N80-34265
SOLID STATE DEVICES
Control means for a solid state crossbar switch
[NASA-CASE-NPO-15066-1] N80-33679
SOLID STATE LASERS
Two approaches towards a low power solid state laser N80-33734
A 2.06 micron-laser rangefinder technology
[AD-A088836] N80-33737
SOLID SURFACES
Determining the form factors of plane and cylindrical surfaces by numerical methods
[INPE-1815-RPE/183] N80-34185
SOLIDIFICATION
Application of solidification theory to rapid solification processing
[AD-A089006] N80-33480
Control of solidification structures and properties of industrial Al-Si alloys
[BLL-RTS-11916] N80-33544
SOLVENT EXTRACTION
Development and application of analytical techniques to chemistry of donor solvent liquefaction
[DOE/PC-20041/T1] N80-33520
Preparation of homogeneous living polyvinyl gels with application to solvent purification
[AD-A088883] N80-33574
SONIC BOOMS
Detection and assessment of secondary sonic booms in New England
[AD-A088180] N80-33362
SORGHUM
A model of plant canopy polarization response
[E80-10306] N80-33635
SORPTION
Sorption, transport and dilatometric studies in glassy polymers N80-33569
SOUND PRESSURE
A study of human throat-wall and vocal tract from input/output measurements N80-34091
SOUND WAVES
The effect of turbulence on wave propagation in the atmosphere: Generation attenuation and scattering N80-33629
Inelastic response of an infinite cylindrical shell to a transient acoustic wave
[AD-A088597] N80-33808
Sodar network support for LIRAQ utilization in conjunction with project MABLE
[PB80-192909] N80-33977
Acoustic plane waves incident on an oblique clamped panel in a rectangular duct
[KU-FRL-417-14] N80-34215
Aircraft noise prediction program validation
[NASA-CR-158333] N80-34219
Quantitative schlieren analysis of acoustic interaction with submerged plates
[AD-A089095] N80-34221
SOUNDING ROCKETS
The design and implementation of a computerized data reduction system
[AD-A088734] N80-34007
SOUTH AFRICA
The problem of wind tunnel flow nonuniformity in free-model aircraft dynamic stability
[CSIR-NIAST-79-80] N80-33352
The aerodynamics of contra-rotating axial flow wind power turbines
[CSIR-ME-1838] N80-33868
The Transfer of Pollutants in Two Southern Hemispheric Oceanic Systems
[REPT-39] N80-33961
A three dimensional finite difference model of the transport of suspended sediment
[CSIR-RR-358] N80-33962
SOUTHERN CALIFORNIA
Assessment of alternative strategies for sludge disposal into deep ocean basins off southern California
[PB80-192990] N80-33971
SPACE EXPLORATION
Cytochemical studies of planetary microorganisms explorations in exobiology
[NASA-CR-163805] N80-34057
SPACE FLIGHT STRESS
USSR Report: Space Biology and Aerospace Medicine, volume 14, no. 4, 1980
[JPRS-76415] N80-34058
Static endurance of rats after flight aboard the Cosmos 936 biosatellite N80-34063
Morphological changes in rat lungs after flight aboard the Cosmos-936 biosatellite N80-34066
Effect of antiorthostatic hypokinesia and space flight factors on change in leg volume N80-34072
SPACE FLIGHT TRACKING AND DATA NETWORK
Networks consolidation program N80-33442
SPACE HEATING (BUILDINGS)
Similitude modeling of natural convection heat transfer through an aperture in passive solar heated buildings
[LA-8365-T] N80-33726
Solar heating system at Quitman County Bank, Marks, Mississippi
[NASA-CR-161549] N80-33858
Installation, operation, and maintenance for the pyramidal optics solar system installed at Yacht Cover, Columbia, South Carolina
[NASA-CR-161203] N80-33864
Design data brochure for a pyramidal optical solar system
[NASA-CR-161202] N80-33865
Comprehensive planning for passive solar architectural retrofit
[AD-A088880] N80-33907
Development of a site-fabricated, building integrated air solar system
[ALO-4123-5] N80-33913
SPACE MAINTENANCE
Extravehicular Crewman Work System (ECWS) study program. Volume 1: Executive summary
[NASA-CR-163597] N80-34101
Extravehicular Crewman Work System (ECWS) study program. Volume 2: Construction
[NASA-CR-163698] N80-34102
Extravehicular Crewman Work System (ECWS) study program. Volume 3: Satellite service
[NASA-CR-163599] N80-34103
Extravehicular Crewman Work System (ECWS) study program. Volume 4: Program evolution
[NASA-CR-163600] N80-34104
SPACE OBSERVATIONS (FROM EARTH)
The table mountain 8-mm-wavelength interferometer N80-33429
A bimodal search strategy for SETI N80-33431
SPACE PLATFORMS
Thermal management for high power space platform systems N80-33472
Power management N80-33475
Extravehicular Crewman Work System (ECWS) study program. Volume 4: Program evolution
[NASA-CR-163600] N80-34104
SPACE POWER REACTORS
Air Force space power technology program N80-33468
SPACE SHUTTLE BOOSTERS
Space shuttle solid rocket booster retrieval system: Five NOSC papers on space shuttle support
[AD-A089060] N80-33458

SPACE SHUTTLE ORBITERS
Orbiter thermal pressure drop characteristics for shuttle orbiter thermal protection system components: High density tile, low density tile, densified low density tile, and strain isolation pad
[NASA-TM-81891] N80-33460
SPACE SHUTTLE PAYLOADS
Extravehicular Crewman Work System (ECWS) study program. Volume 3: Satellite service
[NASA-CR-163598] N80-34103
SPACE SHUTTLES
Shuttle OFT Level C navigation requirements
[NASA-TM-8221] N80-33457
SPACE SUITS
Extravehicular Crewman Work System (ECWS) study program. Volume 1: Executive summary
[NASA-CR-163597] N80-34101
Extravehicular Crewman Work System (ECWS) study program. Volume 2: Construction
[NASA-CR-163698] N80-34102
Extravehicular Crewman Work System (ECWS) study program. Volume 4: Program evolution
[NASA-CR-163600] N80-34104
SPACE TOOLS
Extravehicular Crewman Work System (ECWS) study program. Volume 1: Executive summary
[NASA-CR-163597] N80-34101
Extravehicular Crewman Work System (ECWS) study program. Volume 2: Construction
[NASA-CR-163698] N80-34102
SPACE TRANSPORTATION SYSTEM
Design and technology of solar arrays for shuttle launched missions N80-33883
SPACE TRANSPORTATION SYSTEM FLIGHTS
Shuttle OFT Level C navigation requirements
[NASA-TM-8221] N80-33457
SPACEBORNE EXPERIMENTS
Voyager 1: Encounter with Saturn
[NASA-NEWS-RELEASE-80-159] N80-34324
SPACECRAFT COMMUNICATION
DSN Ground Communications Facility N80-33434
Open-loop radio science with a suppressed-carrier signal N80-33440
Frequency re-use by polarization on diversity on satellite links
[BLL-TRANS-3063] N80-33625
Satellite communication performance evaluation: Computational techniques based on moments
[NASA-CR-163629] N80-33640
SPACECRAFT CONSTRUCTION MATERIALS
Evaluation and prediction of long term space environmental effects on non-metallic materials
[NASA-CR-161585] N80-33479
SPACECRAFT CONTROL
Across three (active control of space structures), phase 1
[AD-A089142] N80-33461
SPACECRAFT DESIGN
International solar polar mission N80-33437
SPACECRAFT GUIDANCE
Shuttle OFT Level C navigation requirements
[NASA-TM-8221] N80-33457
SPACECRAFT LAUNCHING
Launch mission summary: FLTSATCOM-D Atlas/Centaur-57
[NASA-TM-82213] N80-33452
Extravehicular Crewman Work System (ECWS) study program. Volume 3: Satellite service
[NASA-CR-163599] N80-34103
SPACECRAFT MANEUVERS
Extravehicular Crewman Work System (ECWS) study program. Volume 1: Executive summary
[NASA-CR-163597] N80-34101
Extravehicular Crewman Work System (ECWS) study program. Volume 3: Satellite service
[NASA-CR-163599] N80-34103
SPACECRAFT POWER SUPPLIES
Synchronous Energy Technology
[NASA-CP-2154] N80-33465
Spacecraft system overview of space power at geostationary Earth Orbit N80-33469
Thermal management for high power space platform systems N80-33472
Power management N80-33475
Toroidal cell and battery — energy storage for orbital space applications or power cells for electric vehicles
[NASA-CASE-LEW-12918-1] N80-33857
Lead batteries. Citations from the NTIS data base
[PB80-813363] N80-33923
SPACECRAFT RECOVERY
Space shuttle solid rocket booster retrieval system: Five NOSC papers on space shuttle support
[AD-A089060] N80-33458
SPACECRAFT STRUCTURES
On the performance of explicit and implicit algorithms for transient thermal analysis
[NASA-TM-81880] N80-33715
Extravehicular Crewman Work System (ECWS) study program. Volume 2: Construction
[NASA-CR-163698] N80-34102
Extravehicular Crewman Work System (ECWS) study program. Volume 4: Program evolution
[NASA-CR-163600] N80-34104
SPACECRAFT TRACKING
Network functions and facilities N80-33433
The DSN programming system N80-33435
SPACECREWS
Extravehicular Crewman Work System (ECWS) study program. Volume 1: Executive summary
[NASA-CR-163597] N80-34101
SPACELAB
Computer-supported access systems in space flight
[DFVLR-MITT-78-02] N80-34115
SPACELAB PAYLOADS
Experimental work place for the EBOSIPES research project
[DFVLR-MITT-78-02] N80-34122
Software for EBOSIPES: Present state and trends
[DFVLR-MITT-78-02] N80-34123
SPARK IGNITION
The burning velocity inside a spark-ignition engine with different turbulent promoters N80-33746
SPATIAL DISTRIBUTION
Spatially resolved studies of flame and plasma as sources for atomic spectroscopy N80-33511
Impact of cell size on inventory and mapping errors in a cellular geographic information system
[E80-10315] N80-33831
SPECIFIC HEAT
Reasons for the occurrence of smooth work surfaces in metal cutting
[BLL-RTS-12078] N80-33743
SPECIFICATIONS
Improving building construction specifications in state and local governments
[NASA-CR-163623] N80-33612
SPECTRAL EMISSION
Comment on Airglow observations of the OI 7774 A multiplet at Arecibo during a magnetic storm by Roger G. Burnside, John W. Meriwether and James C. G. Walker
[INPE-1843-RPE/203] N80-33994
SPECTRAL ENERGY DISTRIBUTION
The SWAB (Spectral Wave And Bar) program
[PB80-196041] N80-34052
SPECTRAL RECONNAISSANCE
A quantitative evaluation of LANDSAT for monitoring suspended sediments in a fluvial channel N80-33823
Multispectral techniques for remote monitoring of sediment in water: A feasibility investigation
[PB80-198500] N80-33849
SPECTRAL SENSITIVITY
An evaluation of spectrally selective reflectors (cold mirror membranes) for use with concentrator solar arrays N80-33900
SPECTRAL SIGNATURES
A multispectral data simulation technique
[E80-10311] N80-33830
Utilization of spectral-spatial information in the classification of imagery data
[E80-10321] N80-33832
SPECTRORADIOMETERS
Atmospheric solar absorption measurements in the 9 to 11 mu m region using a diode laser heterodyne spectrometer
[NASA-TP-1726] N80-33898
SPECTROSCOPIC ANALYSIS
The ONERA vacuum ultraviolet spectrograph and its use for the study of surface layers in titanium and its alloys N80-33617
Effective depth of spectral line formation in planetary atmospheres
[NASA-CR-163617] N80-34319
SPECTROSCOPY
Experimental investigations of the transport properties of flow suspensions. 1: Measurement of velocity distributions of suspension flows in a rectangular channel. 2: Experimental study of the effective thermal conductivity in shear flow of a suspension. 3: The use of fluorescence correlation spectroscopy to measure molecular diffusion and velocity distributions N80-33711
Positron annihilation gamma ray lineshape studies of defects in solids
[AD-A088956] N80-34267
SPECTRUM ANALYSIS
Spectroscopy of the Mars airglow from Mariner 9 ultraviolet spectrometer data N80-34317
Radio spectral characteristics of extragalactic objects N80-34333
SPECULAR REFLECTION
A model of plant canopy polarization response
[E80-10336] N80-33836
SPEECH
Synthesized voice approach callouts for air transport operations
[NASA-CR-3300] N80-34098
SPEECH RECOGNITION
Automated flight plan filing by simulated voice recognition
[AD-A089138] N80-34105
SPENT FUELS
Evaluation of in-line nondestructive assay systems
[LA-8411-PR] N80-33755
SPHERES
Viscous flow near a sphere under surface gravity waves N80-33701
SPHERICAL SHELLS
Interaction of short wavelength laser radiation with spherical shell targets
[KMSF-U-953] N80-33741
SPILLING
Perspectives on research on LNG vapor cloud dispersion N80-33593
Proceedings of the Workshop on Government Oil Spill Modeling
[NASA-CR-163640] N80-33979
SPLINE FUNCTIONS
Application of a computer programme for the determination of radioimmunological measured values
[BLL-RTS-12046] N80-34084
Parameter estimation in undetermined systems N80-34172
SPRAY CHARACTERISTICS
An air-vapor-droplet local interaction model for spray units N80-33708
SPRAYERS
An air-vapor-droplet local interaction model for spray units N80-33708
SPRINGS (ELASTIC)
Electron microscopical investigation on the age hardening of spring alloys based on Co-Ni-Cr-Fe
[BLL-RTS-12152] N80-33526
SPUTTERING
Aspects of ionization and sputtering in the glow discharge by solids mass spectrometry N80-33508
In situ doping of thin Ca (x)Hg (1-x)Te films obtained by cathode sputtering in mercury vapour. Application to the production of infrared detectors
[BLL-RTS-11980] N80-33528
SQUARE WAVES
Determination of surface active materials by square-wave polarography (polarography with rectangular wave)
[BLL-RTS-12170] N80-34243
STABILITY
Preparation and stability of emulsions of methanol in automobile diesel oil
[CSIR-CENG-294] N80-33579
Numerical study of baroclinic instability
[NASA-CR-161580] N80-33992
The stability of planar dynamical systems linear-in-cones
[CSIR-TWISK-137] N80-34212
STABILITY TESTS
The problem of wind tunnel flow nonuniformity in free-model aircraft dynamic stability
[CSIR-NIAST-79-60] N80-33352
Helicopter flight test instrumentation
[AGARD-AG-160-VOL-10] N80-33406

STABILIZED PLATFORMS
The dynamics and control of large flexible space structures. Volume 3, part B: The modeling, dynamics, and stability of large Earth pointing orbiting structures
[NASA-CR-163812] N80-33449
STAGNATION POINT
Reasons for the occurrence of smooth work surfaces in metal cutting
[BLL-RT3-12079] N80-33743
STAINLESS STEELS
HVEM studies of helium embrittlement in stainless steel N80-33547
Mechanisms responsible for topographical changes in PLT stainless steel and graphite limiters
[PPPL-1671] N80-33564
STALLING
A qualitative discussion of dynamic stall N80-33368
STAPHYLOCOCCUS
Preflight distinctions of Staphylococcus aureus carriers among cosmonauts N80-34062
STAR DISTRIBUTION
A deep near-infrared objective-prism survey for carbon stars toward the galactic center and anticenter N80-34305
STATIC LOADS
The probability of survival of redundant systems under a static load N80-34199
STATIC STABILITY
Stability of nonuniform rotor blades in hover using a mixed formulation
[NASA-TM-81226] N80-33777
STATIC TESTS
Introduction to the fundamentals of strain gauge practice
[NIAST-79/154] N80-33728
On the design verification of large flexible solar arrays: First experiences gained N80-33897
STATISTICAL ANALYSIS
Material characterization for studing flexible pavement behavior in fatigue and permanent deformation N80-33611
Satellite communication performance evaluation: Computational techniques based on moments
[NASA-CR-163629] N80-33640
Numerical studies of dispersion processes in two dimensional, homogeneous, decaying turbulence N80-33700
Background aerosol concentrations for the Namib-Atlantic interface N80-33957
Statistical classification of ice particles and raindrops by pattern recognition techniques N80-34021
Tidal prediction program
[CSIR-SEA-8001] N80-34049
A unit stratifications sample design using rotational sampling N80-34176
Rejection of a single outlier in a factorial design
[CSIR-TWISK-117] N80-34179
Location of multiple outliers in factorial designs, using tetrads
[CSIR-TWISK-127] N80-34181
Analysis of ordered and partially ordered categorical data N80-34196
A first-order methodology for calculating probability of mission success
[AD-A088910] N80-34206
STATISTICAL DECISION THEORY
Statistical considerations in control models with applications
[AD-A088683] N80-34185
A descriptive approach to multiple-criteria decision making
[CSIR-TWISK-128] N80-34291
STATISTICAL TESTS
Testing for equality of variance of correlated normal variables
[CSIR-TWISK-136] N80-34183
STEELS
The behavior of inmold deoxidation in steel castings N80-33550
Digital image processing in ion microscope analysis: Methods of image quantification
[AD-A088792] N80-33559
Combined macroscopic and microscopic approach to the fracture of metals
[DOE/ER-10556/1] N80-33565
Positron annihilation gamma ray lineshape studies of defects in solids
[AD-A088856] N80-34267
STELLAR ATMOSPHERES
Two astrophysical problems in late-type peculiar stars: Calcium in super-metal-rich stars; and carbon nitrogen and oxygen in weak G-band stars N80-34311
STELLAR CORONAS
Computer assisted performance tests of the Lyman Alpha Coronagraph
[NASA-CR-163622] N80-33462
The minimum flux corona; theory or concept
[NASA-CR-163636] N80-34328
STELLAR MAGNITUDE
Spectra of late-type stars in the one to four micron region N80-34302
STELLAR MASS
N-body simulations of stellar systems containing massive black holes N80-34309
STELLAR MASS EJECTION
Mass loss from warm giants: Magnetic effects
[NASA-CR-163602] N80-34322
STELLAR RADIATION
The minimum flux corona; theory or concept
[NASA-CR-163636] N80-34328
STELLAR SPECTRA
Spectra of late-type stars in the one to four micron region N80-34302
A study of the 10830 A line of neutral helium in the spectra of red giants N80-34303
Two astrophysical problems in late-type peculiar stars: Calcium in super-metal-rich stars; and carbon nitrogen and oxygen in weak G-band stars N80-34311
STELLAR TEMPERATURE
Mass loss from warm giants: Magnetic effects
[NASA-CR-163602] N80-34322
STIFFNESS MATRIX
Solution sensitivity and accuracy study of NASTRAN for large dynamic problems involving structural damping N80-33785
STOCHASTIC PROCESSES
A formal program model for discrete event simulation and its use in the verification and validation of system models and implementations N80-34139
Learning algorithms for two person zero-sum stochastic games with incomplete information: A unified approach
[S/IS-7908] N80-34150
Application of a hierarchical structure stochastic learning automation
[S/IS-7906] N80-34151
Stochastic network with recourse N80-34158
Optimal controls that maximize the probability of being in a given set at a given time
[CSIR-TWISK-135] N80-34182
Statistical considerations in control models with applications
[AD-A088683] N80-34185
Asymptotic analysis of linear filtering problems N80-34177
Structures and algorithms in stochastic realization theory and the smoothing problem
[AD-A086485] N80-34192
Maximum likelihood estimation for stationary point processes
[AD-A089117] N80-34205
Coronal heating by stochastic magnetic pumping
[NASA-CR-163637] N80-34330
STORAGE TANKS
A film of large scale field experiments on ethylene hazards N80-33589
STORMS (METEOROLOGY)
Wave information study for United States coastlines. Report 1: Surface pressure field reconstruction for wave hindcasting purposes
[AD-A089150] N80-34029
NMC model performance in the Northeast Pacific
[PB80-196033] N80-34038
The Federal Plan for Meteorological Services and Supporting Research, fiscal year 1981
[PB80-196482] N80-34041
STRAIN ENERGY METHODS
Investigation of vibration reduction through structural optimization
[AD-A088917] N80-33403
Note on the energy release rate for a crack starting from the apex of a wedge
[AD-A089116] N80-33805
Seismic stress relaxation phenomena in an inhomogeneously prestressed medium N80-33983
STRAIN GAGES
Loads calibration of strain gage bridges on the DAST project Aeroelastic Research Wing (ARW-1)
[NASA-TM-81880] N80-33393
Introduction to the fundamentals of strain gauge practice
[NIAST-79/154] N80-33728
STRAIN RATE
Theoretical and numerical analyses of anelastic materials at finite strain N80-33761
STRAPDOWN INERTIAL GUIDANCE
Inertial navigation and guidance. Citations from the NTIS data base
[PB80-812415] N80-33389
STRATEGY
Learning algorithms for two person zero-sum stochastic games with incomplete information: A unified approach
[S/IS-7908] N80-34150
STRATIFICATION
Radiative transfer in one dimensional, discretely stratified media
[AD-A088985] N80-33653
STRATIFIED FLOW
Effects of bottom topography on ocean currents N80-33817
Laboratory studies of topographic effects in rotating and/or stratified fluids N80-33819
STRATIGRAPHY
Contributions of LANDSAT imagery to the geological mapping of the Rio do Grande Sul Shield — Brazil
[INPE-1838-RPE/199] N80-33842
STRATOSPHERE
A sensitivity analysis of volcanic aerosol dispersion in the stratosphere — Mt. Fuego, Guatemala eruptions
[NASA-CR-163606] N80-33926
Dynamic transport of inert tracers by growing baroclinic and stationary planetary waves in the lower stratosphere of the Northern Hemisphere in winter N80-33986
Proceedings of the NATO Advanced Study Institute on Atmospheric Ozone and its variation and human influences
[AD-A088869] N80-34006
STRATUS CLOUDS
Icing characteristics of low altitude, supercooled layer clouds, revision
[AD-A088892] N80-34036
STRESS (PHYSIOLOGY)
Differences in certain physiological, biomechanical, and subjective measures of work effect between males and females while backpacking N80-34089
STRESS ANALYSIS
Introduction to the fundamentals of strain gauge practice
[NIAST-79/154] N80-33728
Theoretical and numerical analyses of anelastic materials at finite strain N80-33761
An analytical and experimental investigation of biaxial loading effects on cracks emanating from a circular hole N80-33762
The twisting and stretching of a nonlinear annulus including the effect of wrinkling N80-33764
Geometrically nonlinear analysis of rectangular glass panels by the finite element method N80-33776
Ring element dynamic stresses N80-33786
A crack opening displacement approach to crack patching
[ARL/STRUC-NOTE-455] N80-33797
Birefringent coating technique, photoelastic stress analysis
[AD-A088657] N80-33799
Mathematical analysis of stress cracks. Citations from the NTIS data base
[PB80-813447] N80-33809
STRESS CONCENTRATION
A study of the magnitude and distribution of the stresses in the end-block of a post-tensioned prestressed concrete beam N80-33771
Stress gradients around notches
[LR-297] N80-33779
On Irwins and Acherbachs expressions for the energy release rate
[AD-A089118] N80-33803
Stress intensity distributions for natural flaw shapes approximating benchmarch geometries
[PB80-200785] N80-33810
Seismic stress relaxation phenomena in an inhomogeneously prestressed medium N80-33983

STRESS CORROSION CRACKING
The stress-wave radiation from growing cracks
[ARL/MAT-REPT-112] N80-33796
STRESS FUNCTIONS
Influence of stress interaction on the behavior of off-axis unidirectional composites
[NASA-CR-163618] N80-33495
STRESS INTENSITY FACTORS
Dynamic fractures in orthotropic fiber composites N80-33486
STRESS RATIO
Some formulas for the crack opening stress level
[M-368] N80-33760
STRESS-STRAIN RELATIONSHIPS
The yielding behavior of unidirectional metal-matrix composites N80-33551
Dynamic evaluation of experimental integral fuel-tank sealants, part 1
[AD-A088573] N80-33573
STRESSES
A study of the magnitude and distribution of the stresses in the end-block of a post-tensioned prestressed concrete beam N80-33771
STRIP TRANSMISSION LINES
Computer-aided analysis for the design of broad classes of microwave couplers, filters, and transmission lines
[AD-A088772] N80-33687
STRUCTURAL ANALYSIS
Analysis and synthesis of operational loads
[RAE-LIB-TRANS-2108(5207)] N80-33757
Ninth NASTRAN Users' Colloquium
[NASA-CP-2151] N80-33782
New capacities and modifications for NASTRAN level 17.5 at DTNSRDC N80-33783
Improvements in sparse matrix operations of NASTRAN N80-33784
Solution sensitivity and accuracy study of NASTRAN for large dynamic problems involving structural damping N80-33785
Ring element dynamic stresses N80-33786
An enhancement of NASTRAN for the seismic analysis of structures — nuclear power plants N80-33787
Solution of enforced boundary motion in direct transient and harmonic problems N80-33788
On the application of nonlinear load elements to thermal analyses using the NASTRAN thermal analyzer N80-33789
NASTRAN analysis of heat-transfer fluid fill pipe failure N80-33790
A NASTRAN investigation of simulated projectile damage effects on a UH-1B tail boom model N80-33791
Finite circular plate on elastic foundation centrally loaded by rigid spherical indenter N80-33792
Elastic-plastic analysis using a triangular ring element in NASTRAN N80-33793
Development and analysis of the learjet 54/55 fuselage NASTRAN model using substructure techniques N80-33794
Comparison of finite element analysis of a piping tee using NASTRAN and CORTES/SA N80-33795
Monitoring by aerial and terrestrial photogrammetry
[PB80-192925] N80-33976
STRUCTURAL DESIGN
Aircraft crash survival design guide. Volume 3: Aircraft structural crashworthiness
[AD-A089104] N80-33385
STRUCTURAL DESIGN CRITERIA
Flying qualities design criteria
[AD-A088629] N80-33402
STRUCTURAL ENGINEERING
Improving building construction specifications in state and local governments
[NASA-CR-163623] N80-33612
Report on visit to Europe in May 1979, covering the 16th Meetings of the International Committee on Aeronautical Fatigue and Associated Visits
[AD-A074392] N80-34339
STRUCTURAL MEMBERS
The interaction between pipe-coatings and cathodic corrosion-protection
[BLL-TRANS-T4943/BG/ERS/79] N80-33541
STRUCTURAL PROPERTIES (GEOLOGY)
Contributions of LANDSAT imagery to the geological mapping of the Rio do Grande Sul Shield — Brazil
[INPE-1838-RPE/199] N80-33842
A bibliography of planetary geology principal investigators and their associates, 1975 - 1980
[NASA-TM-82180] N80-34301
Geologic implications of regional scale variation in lunar crater shape. Fourier crater shape analysis N80-34312
Saturn: Origin and composition of its inner moons and rings
[NASA-CR-163630] N80-34320
STRUCTURAL STABILITY
Time series analysis of wind loadings on hyperbolic cooling towers N80-33772
Inelastic response of an infinite cylindrical shell to a transient acoustic wave
[AD-A088597] N80-33808
STRUCTURAL VIBRATION
Evaluation of Aero Commander sidewall vibration and interior acoustic data: Static operations
[NASA-CR-159290] N80-33392
Investigation of vibration reduction through structural optimization
[AD-A089917] N80-33403
SUBMERGED BODIES
New capacities and modifications for NASTRAN level 17.5 at DTNSRDC N80-33783
SUBROUTINES
Bonne's projection of Meteosat images — subroutines
[CSIR-SR-FIS-201] N80-33837
Tidal prediction program
[CSIR-SEA-8001] N80-34049
SUBSONIC FLOW
Method for inviscid subsonic flows about aircraft configurations N80-33368
Methods for inviscid subsonic flows about unsteady aerofoils N80-33375
SUBSTRUCTURES
Development and analysis of the learjet 54/55 fuselage NASTRAN model using substructure techniques N80-33794
SUGAR CANE
The use of radiation temperature to detect water-stress in sugarcane crop — Brazil
[INPE-1767-TDL/028] N80-33839
SULFONATES
Studies of uniform spherical colloids prepared by emulsion polymerization N80-33568
SULFURIC ACID
The deposition of palladium coatings with low hydrogen content and stress in sulphuric acid electrolyte
[BLL-RTS-12267] N80-33534
SUNLIGHT
Turbid water measurements of remote sensing penetration depth at visible and near-infrared wavelength
[NASA-TM-81943] N80-33827
SUNSPOTS
Statistical relation between the solar cycle and drought in northeast Brazil
[INPE-1839-RPE/200] N80-34024
Sun Series program for the REEDA System — predicting orbital lifetime using sunspot values
[NASA-CR-161579] N80-34327
SUPERCONDUCTING MAGNETS
Two tests of electric fields, second-order in source-velocity terms of closed steady currents. 1: An electron beam. 2: A superconducting coil N80-33674
SUPERCONDUCTIVITY
Superconductivity, magnetism and structural study of some new ternary transition metal borides N80-33675
Phonon-induced nonequilibrium states in superconducting films: A kinetic equation study N80-34263
SUPERCONDUCTORS
Power losses in liquid metal current collectors
[AD-A086527] N80-33684
SUPERFLUIDITY
Superfluidity in 3He-4He mixture thin films N80-33609
Size effects in superfluid 3He N80-33610
SUPERHEATING
Superheating and boiling of water in hydrocarbons and of hydrocarbon mixtures N80-33709
SUPERHIGH FREQUENCIES
Filter project with a planar circuit in the waveguide
[INPE-1817-RPE/185] N80-33680
Impact oscillator waveguides
[INPE-1816-RPE/184] N80-33682
SUPERSATURATION
Homogeneous vapor phase nucleation of large polar molecules under Limiting experimental conditions: High temperatures, low pressures, and long growth times — cloud chamber studies N80-34234
SUPERSONIC COMBUSTION RAMJET ENGINES
Conceptual model of turbulent flameholding for scramjet combustors
[NASA-TP-1543] N80-33409
SUPERSONIC CRUISE AIRCRAFT RESEARCH
Time-temperature-stress capabilities of composite materials for advanced supersonic technology application, phase 1
[NASA-CR-159267] N80-33496
SUPERSONIC FLIGHT
Detection and assessment of secondary sonic booms in New England
[AD-A088160] N80-33362
SUPERSONIC FLOW
A comprehensive investigation into the supersonic viscous flow about a slender cone at high angle of attack: Experimental and theoretical results N80-33344
Linearised methods in supersonic flow N80-33360
SUPERSONIC TRANSPORTS
Conceptual study of an advanced supersonic technology transport (AST-107) for transpacific range using low-bypass-ratio turbofan engines
[NASA-TM-81872] N80-33342
SURFACE CRACKS
Three-dimensional finite element analysis of cyclic fatigue crack growth of multiple surface flaws N80-33768
The stress-wave radiation from growing cracks
[ARL/MAT-REPT-112] N80-33796
SURFACE FINISHING
Resistance to corrosion of chromated zinc coatings
[BLL-RTS-12304] N80-33536
The mechanical pretreatment of printed circuit boards
[BLL-RTS-12263] N80-33671
Magnetic-abrasive machining
[BLL-RTS-12400] N80-33742
SURFACE LAYERS
Analysis of unstable optical resonators
[AD-A088600] N80-34255
SURFACE PROPERTIES
Surface oxide softening in tungsten N80-33549
Surface energy budget of the Tropical Pacific Ocean
[AD-A089148] N80-34030
SURFACE REACTIONS
Characterization of surface complexes on lithium N80-33546
The passivity of nickel-effects of applied potential, solution pH and environmental temperature N80-33553
Role of surface chemistry in the ignition of pyrotechnic materials
[MLM-2708(OP)] N80-33603
Determination of surface active materials by square-wave polarography (polarography with rectangular wave)
[BLL-RTS-12170] N80-34243
Fixation of Zn(ii) ions on metal oxide surfaces
[BLL-RTS-12200] N80-34262
SURFACE ROUGHNESS
Reasons for the occurrence of smooth work surfaces in metal cutting
[BLL-RTS-12078] N80-33743
SURFACE ROUGHNESS EFFECTS
Frosted solar cell covers — optical properties N80-33877
SURFACE TEMPERATURE
The effect of surface energy on temperature rise around a fast running crack
[AD-A088756] N80-33804
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland
[E80-10228] N80-33829
Defining relationships between surface characteristics and actual evaporation rate
[E80-10335] N80-33834

Thermal balance of soils
[INPE-1959-RPE/219] N80-33941

Climatic maps of the sea surface-air difference in vapour pressure and in potential temperature over the eastern Indian Ocean
[AD-A089022] N80-34050

SURFACE VEHICLES

A method of measuring the visibility of military objects
[RAE-LIB-TRANS-1981(5207)] N80-34242

SURFACE WATER

Preliminary study of the potential environmental concerns associated with surface waters and geothermal development of the Valles Caldera
[LA-8388-MS] N80-33969

SURFACE WAVES

Spectral growth and nonlinear characteristics of wind waves in Lake Ontario
[PB80-193261] N80-33850

SURFACTANTS

Ion flotation studies and separation procedures for the platinum group metals N80-33545

Studies of uniform spherical colloids prepared by emulsion polymerization N80-33568

Determination of surface active materials by square-wave polarography (polarography with rectangular wave)
[BLL-RTS-12170] N80-34243

SURVEILLANCE RADAR

Spectrum resource assessment in the 2.7 to 2.9 GHz band. Phase 2: LSR deployment in the Los Angeles and San Francisco areas
[PB80-194467] N80-33391

SURVEYS

A unit stratifications sample design using rotational sampling N80-34176

SWEPT WINGS

Low-speed aerodynamic characteristics of a highly swept arrow wing configuration with several deflected leading edge concepts
[NASA-TM-80180] N80-33347

SWITCHING CIRCUITS

Control means for a solid state crossbar switch
[NASA-CASE-NPO-15088-1] N80-33679

SWITCHING THEORY

World progress in electronic switching. Part 2: Analysis of current trends — in microelectronics for data transmission
[BLL-TRANS-3756-(7737.470)] N80-33670

Real-time telephone traffic simulation using learning automata routing
[S/IS-7909] N80-34148

SWITZERLAND

The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland
[E80-10228] N80-33829

SYNCHRONOUS SATELLITES

FLTSATCOM-D
[NASA-NEWS-RELEASE-80-158] N80-33424

Meteor and remote sensing satellites (a collection of articles)
[NASA-TM-76389] N80-33453

Launch mission summary and terminal countdown, Delta 153 Satellite Business Systems satellite (SBS-A)
[NASA-TM-82212] N80-33455

Synchronization tolerance to receiving errors in coded EM and PCM signals transmitted by meteorological satellites
[INPE-1760-RPE/149] N80-33644

Geometry of an antenna positioner for geostationary satellites
[INPE-1795-NTE/161] N80-33646

Effect of downlink phased array patterns on system availability contour predictions
[AD-A089664] N80-33661

Algorithm for extracting data from meteorological satellites for use in estimating precipitation
[INPE-1769-RPE/155] N80-34026

SYNOPTIC METEOROLOGY

Medium-scale study of a waving cold front
[BLL-TRANS-1453-(9022.549)] N80-34013

Climatological relationships of severe duststorms in the Great Plains to synoptic weather patterns: A potential for predictability
[NASA-CR-163626] N80-34022

Development of an automatic system for plotting synoptic charts
[INPE-1786-RPE/158] N80-34025

SYNTHESIS (CHEMISTRY)

Formation of organosilicon compounds. 58: Synthesis of a carbosilane with propellane structure
[RAE-LIB-TRANS-2029(5207)] N80-33483

SYNTHETIC FUELS

Oversight: Alternate liquid fuels technology
[GPO-50-313] N80-33580

Oversight: Cost estimation techniques for emerging synthetic fuels technology, volume 9
[GPO-51-721] N80-33581

Energy policy: Supply and demand alternatives
[GPO-56-541] N80-33870

SYSTEM FAILURES

Equivalence techniques for vibration testing N80-33760

The probability of survival of redundant systems under a static load N80-34199

A first-order methodology for calculating probability of mission success
[AD-A088910] N80-34206

SYSTEMS ANALYSIS

Inertial navigation and guidance. Citations from the NTIS data base
[PB80-812415] N80-33389

Omega navigation system. Citations from the NTIS data base
[PB80-812712] N80-33390

Effects of criteria on flight simulation study 1: Heading deviation tolerance
[AD-A088908] N80-33423

Satnet development and operation. Pluribus satellite IMP development. Remote site maintenance. Internet development. Mobile Access Terminal Network. TCP for the HP 3000. TCP - TAC
[AD-A089025] N80-33458

Propagation modeling and evaluation of communication system performance in nuclear environments
[AD-A088914] N80-33664

Identification and analysis of simple models for the response time of complex computer systems N80-34157

Universal approximations of control systems over finite time N80-34208

Consistency, redundancy and extension in fuzzy systems for regressive decision
[INPE-1850-RPE/207] N80-34210

SYSTEMS ENGINEERING

Air Force space power technology program N80-33468

Spacecraft system overview of space power at geostationary Earth Orbit N80-33469

Electrochemical Orbital Energy Storage (ECOES) technology program — regenerative fuel cell system N80-33473

Development of a scanning electron microscope based microanalytical system N80-33512

Satellite Power Systems (SPS) concept definition study. Volume 2, part 2: System engineering — cost and programmatics
[NASA-CR-3319] N80-33869

Low-cost flywheel demonstration program
[COINS-5085-T2] N80-33909

Passenger comfort technology for system decision making
[NASA-TM-81875] N80-34096

Digital computers as components of complex systems
[DFVLR-MITT-78-02] N80-34113

Self-replicating systems: A systems engineering approach
[NASA-TM-78304] N80-34209

SYSTEMS MANAGEMENT

Responsiveness and configuration control for embedded computer software
[AD-A088723] N80-34155

The revised organic chemical producers data base system
[PB80-199605] N80-34287

SYSTEMS SIMULATION

Propagation modeling and evaluation of communication system performance in nuclear environments
[AD-A088914] N80-33664

SYSTEMS STABILITY

Across three (active control of space structures), phase 1
[AD-A089142] N80-33461

T

TABLES (DATA)

Evaluation of cranking characteristics of commercially available batteries between room temperature and -40 C
[AD-A080614] N80-33906

Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 1: Optical auroral images and related direct measurements
[NASA-TM-81121] N80-33997

Analysis of ordered and partially ordered categorical data N80-34196

TAIL ASSEMBLIES

A NASTRAN investigation of simulated projectile damage effects on a UH-1B tail boom model N80-33791

TAKEOFF

Conceptual point design study of a new CTOL SETOLS CAS aircraft for 1995 IOC
[AD-A088351] N80-33400

TANKER SHIPS

Explosion hazards in the Suez Canal: An overview N80-33584

TARGET ACQUISITION

Advanced electro-optical tracker/ranger
[AD-A089143] N80-34254

TARGET RECOGNITION

Radar waveform synthesis for target identification
[AD-A088673] N80-33680

TASKS

Effect of task variable interactions in lifting and lowering N80-34090

TECHNOLOGICAL FORECASTING

Cargo Logistics Airlift Systems Study (CLASS). Volume 5: Summary
[NASA-CR-158951] N80-33382

Report on visit to Europe in May 1979, covering the 16th Meetings of the International Committee on Aeronautical Fatigue and Associated Visits
[AD-A074392] N80-34339

TECHNOLOGY ASSESSMENT

Application of advanced technologies to small, short-haul air transports
[NASA-CR-152364] N80-33396

Synchronous energy technology program N80-33466

NASA technology program overview N80-33467

Status of nickel-hydrogen cell technology N80-33474

Alternatives for the development of future television systems
[BLL-RTS-12332] N80-33626

Techniques for examining drop size spectra in water sprays and clouds
[ARL/MECH-ENG-NOTE-375] N80-33721

Potential of spark ignition engine, electronic engine and transmission control
[PB80-192701] N80-33751

State-of-the-art reviews and bibliographies on energy. Citations from the NTIS data base
[PB80-812896] N80-33917

State-of-the-art reviews and bibliographies on energy. Citations from the NTIS data base
[PB80-812894] N80-33918

Conservation and solar energy programs of the Department of Energy: A critique
[PB80-197759] N80-33922

Assessment of H2S control technologies for geothermal power plants
[PB80-193709] N80-33973

Technology Assessment. Citations from the NTIS data base
[PB80-813165] N80-34299

Technology Assessment. Citations from the NTIS data base
[PB80-813173] N80-34300

TECHNOLOGY TRANSFER

Announcement services and publications N80-34293

TECHNOLOGY UTILIZATION
Application of advanced technologies to small, short-haul air transports
[NASA-CR-152364] N80-33396
Private sector involvement in civil space remote sensing. Volume 1: Report
[NASA-TM-82206] N80-33845
Private sector involvement in civil space remote sensing. Volume 2: Appendices
[NASA-TM-82207] N80-33846
Digital computers as components of complex systems
[DFVLR-MITT-79-02] N80-34113
TECTONICS
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research
[NASA-TM-82215] N80-33999
TEETH
Comparative study of effects of weightlessness and artificial gravity on density, ash, calcium and phosphorous content of calcified tissues N80-34084
TELECOMMUNICATION
The TRANSMIC system. 1: General principles and presentation
[BLL-RDL-TRANS-3766-(7737.470)] N80-33623
The TRANSMIC system. 3: Operations, availability and quality of service
[BLL-RDL-TRANS-3765-(7737.470)] N80-33624
Telecommando transmission system for stratospheric balloons
[INPE-1830-RPE/194] N80-33645
Geometry of an antenna positioner for geostationary satellites
[INPE-1795-NTE/161] N80-33646
Propagation modeling and evaluation of communication system performance in nuclear environments
[AD-A088914] N80-33664
Telematics and satellites. Part 1: Information systems
[ESA-SR-04-PT-1] N80-33668
Real-time telephone traffic simulation using learning automata routing
[S/IS-7909] N80-34148
TELEMETRY
Launch mission summary and terminal countdown, Delta 153 Satellite Business Systems satellite (SBS-A)
[NASA-TM-82212] N80-33455
TELEPHONES
Real-time telephone traffic simulation using learning automata routing
[S/IS-7909] N80-34148
Simulation study of telephone traffic routing using learning algorithms, part 2
[S/IS-7907-PT-2] N80-34149
TELEPHONY
Syncompex: A voice processing system for low cost HF radio telephony
[CRC-1316-E] N80-33648
ANIK-B Doc communications system and ground terminals
[CRC-TN-704-E] N80-33649
TELEPHOTOMETRY
Development and evaluation of a prototype automated telephotometer system
[EPRI-EA-1434] N80-33731
TELEVISION EQUIPMENT
A set of time varying television test patterns
[BBC-RD-1980/9] N80-33638
TELEVISION SYSTEMS
Alternatives for the development of future television systems
[BLL-RTS-12332] N80-33626
TELLURIC LINES
Spectra of late-type stars in the one to four micron region N80-34302
TEMPERATURE CONTROL
Thermal management for high power space platform systems N80-33472
Power management N80-33475
TEMPERATURE DISTRIBUTION
On the performance of explicit and implicit algorithms for transient thermal analysis
[NASA-TM-81880] N80-33715
Low frequency temperature fluctuations in the upper 400 meters of the central North Pacific N80-34042
TEMPERATURE EFFECTS
Effects of ultra-high pressures on methanol, ethanol, calcium oxide, rutile, cassiterite, and germanium dioxide N80-33515
Long-time creep behavior of the niobium alloy C-103
[NASA-TP-1727] N80-33555
Evaluation of specialized photoacoustic absorption chambers for Near Millimeter Wave (NMMW) propagation measurements
[AD-A088842] N80-33654
Characterization of three types of silicon solar cells for SEPS Deep Space Mission. Volume 3: Current-voltage characteristics of spectrolab sculptured BSR/P+ (K7), BSR/P+ (K6.5) and BSR (K4.5) cells as a function of temperature and intensity
[NASA-TM-78305] N80-33863
Meeting of the IRIS specialty group on infrared detectors, volume 1
[ERIM-139600-3-X(I)] N80-34241
TEMPERATURE GRADIENTS
The effect of surface energy on temperature rise around a fast running crack
[AD-A088754] N80-33804
Measurements of boundary layer flow over a forested mountain slope N80-34018
Low frequency temperature fluctuations in the upper 400 meters of the central North Pacific N80-34042
TEMPERATURE INVERSIONS
Atmospheric variability and air-sea interaction N80-34023
TEMPERATURE MEASUREMENT
Great Lakes degree-day and temperature summaries and norms, 1897 - 1977
[PB80-195877] N80-34040
TENSILE STRENGTH
Evaluation of amorphous ribbon reinforced resin matrix composites
[AD-A089102] N80-33501
TENSILE STRESS
Stress gradients around notches
[LR-297] N80-33779
A design study in crack patching
[ARL/STRUC-REPT-376] N80-33798
TENSOMETERS
Determination of surface active materials by square-wave polarography (polarography with rectangular wave)
[BLL-RTS-12170] N80-34243
TENSORS
Tensor products and Banach ideals of p-compact operators
[CSIR-TWISK-132] N80-34211
TERMINAL CONFIGURED VEHICLE PROGRAM
Longitudinal stability and control in wind shear with energy height rate feedback
[NASA-TM-81828] N80-33416
TERMINOLOGY
Environmental assessment data systems: Terminology reference manual
[PB80-197916] N80-34288
TERNARY SYSTEMS
Superconductivity, magnetism and structural study of some new ternary transition metal borides N80-33675
TERRADYNAMICS
Fundamentals studies in geodynamics
[NASA-CR-163620] N80-33993
TERRAIN
Changes in the potential for wind energy generation due to terrain modification of the boundary-layer flow N80-34020
TERRAIN ANALYSIS
Application of thematic mapping techniques in terrain analysis
[AD-A089061] N80-33847
TERRESTRIAL RADIATION
Development of a technique for determining natural radioactivity using slow-speed aircraft at low altitudes
[INPE-1831-RPE/195] N80-33838
Thermal balance of soils
[INPE-1859-RPE/210] N80-33841
TEST CHAMBERS
Large scale gas explosion experiments in Norway N80-33592
TEST PATTERN GENERATORS
A set of time varying television test patterns
[BBC-RD-1980/9] N80-33638
TESTS
Lesions to and recovery of mouse seminiferous epithelium after exposure to radiation at different dose rates N80-34079
TETHERLINES
Investigation of electrodynamic stabilization and control of long orbiting tethers
[NASA-CR-161584] N80-33748
TETRAD THEORY
Location of multiple outliers in factorial designs, using tetrads
[CSIR-TWISK-127] N80-34181
THEMATIC MAPPING
Impact of cell size on inventory and mapping errors in a cellular geographic information system
[E80-10315] N80-33831
Contributions of LANDSAT imagery to the geological mapping of the Rio do Grande Sul Shield — Brazil
[INPE-1838-RPE/195] N80-33842
Application of thematic mapping techniques in terrain analysis
[AD-A089061] N80-33847
THEOREMS
Topics in model completeness of direct powers and direct products of theories N80-34189
THEORETICAL PHYSICS
Precise predictions of grand unified gauge theories N80-33627
THERMAL CONDUCTIVITY
Thermal management for high power space platform systems N80-33472
Conduction heat transfer analysis in composite materials
[AD-A088741] N80-33499
Enhancement of thermal energy transport through granular media N80-33702
THERMAL CYCLING TESTS
Efficient thermal cycling of solar panels in solar simulation facilities with a multi-panel test rig N80-33898
THERMAL DIFFUSION
On the microwave interaction with matter and microwave breakdown of air
[AD-A088936] N80-33656
Finite element modeling of the coupled thermal and momentum diffusion equations
[AD-A088668] N80-34277
THERMAL MAPPING
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland
[E80-10229] N80-33829
The use of radiation temperature to detect water-stress in sugarcane crop — Brazil
[INPE-1767-TDL/028] N80-33839
THERMAL NOISE
Intrinsic sources of IM generation
[AD-A086771] N80-33658
THERMAL PLASMAS
Heavy ions in Jupiter's environment
[NASA-CR-163603] N80-34321
THERMAL PROTECTION
Orbiter thermal pressure drop characteristics for shuttle orbiter thermal protection system components: High density tile, low density tile, densified low density tile, and strain isolation pad
[NASA-TM-81891] N80-33460
Improved bond coatings for use with thermal barrier coatings
[NASA-TM-81567] N80-33556
THERMAL RADIATION
An accurate and computationally fast formulation for radiative fields and heat transfer in general, plane-parallel, non-grey media with anisotropic scattering N80-33713
THERMAL VACUUM TESTS
Efficient thermal cycling of solar panels in solar simulation facilities with a multi-panel test rig N80-33898
THERMODYNAMIC EFFICIENCY
Coal gasification combined-cycle system analysis
[EPRI-AP-1390] N80-33601
THERMODYNAMIC PROPERTIES
Study of the internal mechanics of space photovoltaic generators N80-33878
THERMODYNAMICS
Finite element modeling of the coupled thermal and momentum diffusion equations
[AD-A088668] N80-34277

THERMOELASTICITY
Conservation laws with dissipation
[AD-A089762] N80-34276

THERMOREGULATION
The role of temperature in experiments on biological objects under extreme conditions N80-34080

THERMOSIPHONS
The solution cycle in an absorption system with pressure equalizing gas (theoretical and experimental investigations)
[BLL-RTS-12307] N80-33608

THICK FILMS
Integrated screen printed hybrid circuits
[BLL-PO-TRANS-3749-(7737.470)] N80-33689
Phonon-induced nonequilibrium states in superconducting films: A kinetic equation study N80-34260

THICKNESS
Investigations into the distribution of the layer thickness produced by barrel electroplating in the case of cyanic silver plating
[BLL-RTS-12294] N80-33539

THIN FILMS
The activated carbon thin film adsorber N80-33518
In situ doping of thin Ca (x)Hg (1-x)Te films obtained by cathode sputtering in mercury vapour. Application to the production of infrared detectors
[BLL-RTS-11980] N80-33526
Superfluidity in 3He-4He mixture thin films N80-33609
Laminar film flow phenomena-theory and application to the two-phase closed thermosyphon N80-33703
Electrochemically deposited cadmium telluride films and their application to solar cells N80-33853
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/1] N80-33814
Phonon-induced nonequilibrium states in superconducting films: A kinetic equation study N80-34263
Ion-beam-induced modifications of thin film structures and formation of metastable phases N80-34265

THIOUREAS
Effects of flame protection media in the etching of copper — thioureas
[BLL-RTS-12359] N80-33539

THREE DIMENSIONAL BOUNDARY LAYER
Calculation of laminar heating rates on three-dimensional configurations using the axisymmetric analogue
[NASA-TP-1696] N80-33719

THREE DIMENSIONAL FLOW
Numerical method for predicting flow characteristics and performance of nonaxisymmetric nozzles. Part 2: Applications
[NASA-CR-3264] N80-33354
WIND: Computer program for calculation of three dimensional potential compressible flow about wind turbine rotor blades
[NASA-TP-1729] N80-33357

THREE DIMENSIONAL MOTION
Determining the three-dimensional motion and model of objects from a sequence of images N80-34136

THRESHOLDS (PERCEPTION)
Development and application of a brain stem audiometer N80-34080

THROATS
A study of human throat-wall and vocal tract from input/output measurements N80-34091

TIDES
Low frequency sea level variability along the west coast of North America N80-34046
Tidal prediction program
[CSIR-SEA-8001] N80-34049
The SWAB (Spectral Wave And Bar) program
[PB80-196041] N80-34052

TILTING ROTORS
A flight investigation of performance and loads for a helicopter with 10-64C main rotor blade sections
[NASA-TM-81871] N80-33348

TIME CONSTANT
A simple method for converting frequency domain aerodynamics to the time domain
[NASA-TM-81944] N80-33358

TIME DEPENDENCE
A rapid implicit-explicit solution to the two-dimensional time dependent incompressible Navier-Stokes equations
[NASA-CR-3330] N80-33718

TIME MEASUREMENT
The 1979 towed source experiment signal generator
[AD-A089757] N80-33689

TIME SERIES ANALYSIS
Time series analysis of wind loadings on hyperbolic cooling towers N80-33772

TIME SHARING
Satnet development and operation. Pluribus satellite IMP development. Remote site maintenance. Internet development. Mobile Access Terminal Network. TCP for the HP 3000. TCP - TAC
[AD-A089025] N80-33456

TIN ALLOYS
The reflowing of tin-lead deposits
[BLL-RTS-12262] N80-33533

TIN OXIDES
The determination of tin oxide in airborne dust N80-33944

TIP SPEED
A flight investigation of performance and loads for a helicopter with 10-64C main rotor blade sections
[NASA-TM-81871] N80-33348

TISSUES (BIOLOGY)
Morphological changes in rat lungs after flight aboard the Cosmos-936 biosatellite N80-34066
Template activity of chromatin DNA and the adenylate cyclase system of rat tissues following flight aboard the Cosmos-936 biosatellite N80-34067
The role of temperature in experiments on biological objects under extreme conditions N80-34080
Distribution of benzene in tissues of hypokinetic animals N80-34083

TITAN
Saturn: Origin and composition of its inner moons and rings
[NASA-CR-163630] N80-34320

TITANIUM
Thermal and electrostatic initiation of TiH/sub x based pyrotechnics
[MLM-2710(OP)] N80-33604

TITANIUM ALLOYS
Pilot plant forging of hydrogenated Ti-6Al-4V
[AD-A089107] N80-33558

TOKAMAK DEVICES
Introduction to magnetic confinement fusion diagnostics
[UCID-18704] N80-34240
Effect of ICRF heating on single particle confinement in Tokamaks
[AD-A088578] N80-34261

TOLERANCES (MECHANICS)
Synchronization tolerance to receiving errors in coded EM and PCM signals transmitted by meteorological satellites
[INPE-1760-RPE/149] N80-33644

TOLERANCES (PHYSIOLOGY)
Effect of conditioning animals for hypoxia on their resistance to poison inhalation N80-34076

TOMOGRAPHY
Vaporization of droplets in premixing chambers
[NASA-CR-163616] N80-33714

TOPOGRAPHY
Effects of bottom topography on ocean currents N80-33817
Laboratory studies of topographic effects in rotating and/or stratified fluids N80-33819
Orographic effects in the atmospheres of other planets — Viking Mars observations N80-33822
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland
[E80-10229] N80-33829
Long wave trapping by a linear ridge topography
[AD-A088640] N80-34051

TORO ASTEROID
Planetary radar N80-33445

TOROIDS
Toroidal cell and battery — energy storage for orbital space applications or power cells for electric vehicles
[NASA-CASE-LEW-12918-1] N80-33857

TORSION
An investigation of certain fundamental invariance properties of field theories including gravitational theories with torsion N80-33987
Torsion theory and modules of finite length N80-34173

TOWERS
Time series analysis of wind loadings on hyperbolic cooling towers N80-33772

TOXIC HAZARDS
Controlling hazardous wastes research summary
[PB80-194202] N80-33970
Development and validation of methods for sampling and analysis of workplace toxic substances
[PB80-194574] N80-34085

TOXICITY
Effect of conditioning animals for hypoxia on their resistance to poison inhalation N80-34076

TOXICOLOGY
Hygiene and toxicology of human waste gases N80-34059

TRACKING (POSITION)
Detection and assessment of secondary sonic booms in New England
[AD-A089160] N80-33962

TRACKING STATIONS
Network functions and facilities N80-33433
Networks consolidation program N80-33442

TRAILING EDGES
Circulation Control Wing (CCW) Flight Tests N80-33339

TRAINING ANALYSIS
Digital Avionics Information System (DAIS): Life cycle cost impact modeling system Reliability, Maintainability, and Cost Model (RMCM): User's guide
[AD-A089045] N80-33405

TRAINING SIMULATORS
Effects of criteria on flight simulation study 1: Heading deviation tolerance
[AD-A088908] N80-33423
Effects of magnification and visual accommodation on aimpoint estimation in simulated landings with real and virtual image displays
[NASA-TP-1635] N80-34099

TRAJECTORIES
Launch mission summary and terminal countdown, Delta 153 Satellite Business Systems satellite (SBS-A)
[NASA-TM-82212] N80-33455

TRANSFER FUNCTIONS
A simple method for converting frequency domain aerodynamics to the time domain
[NASA-TM-81944] N80-33358

TRANSFERRING
The Transfer of Pollutants in Two Southern Hemispheric Oceanic Systems
[REPT-39] N80-33961

TRANSFORMATIONS
Non-projective transformations in optics N80-34246

TRANSFORMATIONS (MATHEMATICS)
On the asymptotic analysis of Griffiths' period mapping N80-34174
Topics in analysis
[AD-A080463] N80-34189
On reversible transformations of space elements
[AD-A080447] N80-34202

TRANSFORMERS
Bearing And Power Transfer Assembly (BAPTA) with rotary transformer N80-33902

TRANSIENT RESPONSE
A numerical boundary integral equation method for transient motions N80-34168

TRANSISTORS
Bright dipping solution for iron-nickel-cobalt alloys
[BLL-RTS-12198] N80-33529

TRANSITION METALS
Superconductivity, magnetism and structural study of some new ternary transition metal borides N80-33675

TRANSITION TEMPERATURE
Size effects in superfluid 3He N80-33610

TRANSMISSION LINES
A fiber optic transmission line stabilization apparatus and method
[NASA-CASE-NPO-15036-1] N80-34250

TRANSMISSION LOSS
Acoustic plane waves incident on an oblique clamped panel in a rectangular duct
[KU-FRL-417-14] N80-34215
TRANSMITTER RECEIVERS
Telecommando transmission system for stratospheric balloons
[INPE-1830-RPE/194] N80-33645
TRANSONIC FLOW
Experimental unsteady aerodynamics of conventional and supercritical airfoils — conducted in the Ames 11 foot transonic wind tunnel
[NASA-TM-81221] N80-33345
Calculation of three-dimensional unsteady transonic flows past helicopter blades
[NASA-TP-1721] N80-33356
Transonic shock wave - boundary layer interactions
[AD-A088831] N80-33359
A study of hybrid computing techniques for transonic flow fields
[AD-A088662] N80-33360
Numerical solution techniques for unsteady transonic aerodynamics problems N80-33379
A compendium of computational fluid dynamics at the Langley Research Center
[NASA-TM-81877] N80-33716
TRANSONIC WIND TUNNELS
Plenum response to simulated disturbances of the model and fan inlet guide vanes in a transonic tunnel
[NASA-TM-81869] N80-33418
TRANSPONDERS
AN/K-8 Doc communications system and ground terminals
[CRC-TN-704-E] N80-33849
TRANSPORT AIRCRAFT
Evaluation of laminar flow control system concepts for subsonic commercial transport aircraft
[NASA-CR-159253] N80-33394
TRANSPORT PROPERTIES
Hydrogen transport in nickel base superalloys N80-33552
Sorption, transport and dilatometric studies in glassy polymers N80-33569
Experimental investigations of the transport properties of flow suspensions. 1: Measurement of velocity distributions of suspension flows in a rectangular channel. 2: Experimental study of the effective thermal conductivity in shear flow of a suspension. 3: The use of fluorescence correlation spectroscopy to measure molecular diffusion and velocity distributions N80-33711
The perturbation of some atmospheric mechanisms by emissions from aircraft
[AD-A089100] N80-33965
TRAVELING IONOSPHERIC DISTURBANCES
Radar observations of the equatorial electrojet irregularities and theory of type 1 turbulence N80-33990
TRAVELING WAVE TUBES
Microwave tubes
[AD-A088745] N80-33688
TREES (PLANTS)
Site index prediction tables for oak in northwestern West Virginia
[PB80-189830] N80-33852
TRIANGULATION
A linear photodiode array employed in a short range laser triangulation obstacle avoidance sensor — Martian roving vehicle sensor
[NASA-CR-163613] N80-33747
TRINITROTOLUENE
TNT equivalency testing of chemical mixtures in continuous TNT manufacturing
[AD-A088903] N80-33800
TRIVALENT IONS
The determination of uni and tri valent gold in acid gold baths
[BLL-RTS-12157] N80-33504
TROPICAL REGIONS
Surface energy budget of the Tropical Pacific Ocean
[AD-A089143] N80-34030
TROPICAL STORMS
Tropical cyclone genesis: Numerical modeling inferences N80-34016
TROPOSPHERE
Relationship between short and long term rainfall rates and its implication for the design of radio links
[BLL-RDL-TRANS-3665-(7737.470)] N80-33843
TROPOSPHERIC SCATTERING
Tropospheric scatter communications. Citations from the NTIS data base
[PB80-812571] N80-33386
TROPOSPHERIC WAVES
Mountain waves and momentum flux N80-33815
TRUCKS
Verification test of the bathronic mini van
[AD-A089058] N80-34298
TRUNCATION ERRORS
Errors in finite-difference computations on curvilinear coordinate systems
[NASA-CR-163601] N80-34179
TUNGSTEN
Surface oxide softening in tungsten N80-33549
TUNING
Atmospheric solar absorption measurements in the 9 to 11 mu m region using a diode laser heterodyne spectrometer
[NASA-TP-1726] N80-33998
TURBIDITY
Multispectral techniques for remote monitoring of sediment in water: A feasibility investigation
[PB80-196500] N80-33849
Turbid water measurements of remote sensing penetration depth at visible and near-infrared wavelength
[NASA-TM-81843] N80-33927
TURBINE BLADES
WIND: Computer program for calculation of three dimensional potential compressible flow about wind turbine rotor blades
[NASA-TP-1729] N80-33357
Experimental performance and analysis of 15.04-centimeter-tip-diameter, radial-inflow turbine with work factor of 1.126 and thick blading
[NASA-TP-1730] N80-33410
TURBOFAN ENGINES
Conceptual study of an advanced supersonic technology transport (AST-107) for transpacific range using low-bypass-ratio turbofan engines
[NASA-TM-81872] N80-33342
Regression modeling of turbine engine performance
[AD-A088898] N80-33411
Determination of pollutant emissions characteristics of General Electric CF6-6 and CF6-50 model engines
[AD-A088927] N80-33412
TURBOFANS
High bypass turbofan component development. Amendment 1: Small fan redesign
[AD-A089067] N80-33413
TURBOGENERATORS
MOD-2 wind turbine farm stability study
[NASA-CR-165156] N80-33662
TURBOJET ENGINES
Effect of cage design on characteristics of high-speed-jet-lubricated 35-millimeter-bore ball bearing — turbojet engines
[NASA-TP-1732] N80-33749
TURBOMACHINERY
Unsteady aerodynamics in turbomachinery N80-33369
TURBOPROP AIRCRAFT
Evaluation of Aero Commander sidewall vibration and interior acoustic data: Static operations
[NASA-CR-159290] N80-33392
TURBULENCE
The burning velocity inside a spark-ignition engine with different turbulent promoters N80-33748
TURBULENCE EFFECTS
Research on vapor cloud explosions in the United Kingdom N80-33588
TURBULENT BOUNDARY LAYER
Transonic shock wave - boundary layer interactions
[AD-A088831] N80-33359
Analytical methods for prediction of unsteady turbulent boundary layers N80-33377
TURBULENT FLOW
On the swelling of rolled up vortex surfaces and the breakdown of the vortex core for slender wings
[NASA-TM-75662] N80-33346
Study of laminar and turbulent flow in ducts of polar cross-section N80-33699
Coherent structures in the similarity region of a two-dimensional turbulent jet: A vortex street
[AD-A088750] N80-33720
TURBULENT HEAT TRANSFER
Turbulent heat transfer to liquid metals in a circular pipe N80-33705
Dispersed flow heat transfer in circular tubes N80-33706
TURBULENT MIXING
A study of the microstructure of convective clouds: Observation and theory N80-34019
A two-dimensional diabatic isopycnal model of a coastal upwelling front N80-34043
TWO BODY PROBLEM
Two problems pertaining to the dynamics of the origin of the Moon, and its subsequent orbital evolution N80-34310
TWO DIMENSIONAL BODIES
Study for conceptual design of VEO, VTOL exhaust nozzle
[NASA-CR-152388] N80-33397
TWO DIMENSIONAL FLOW
Vibrations of several obstacles within the two dimensional flow of incompressible fluid N80-33614
Reverse pseudo-unsteady aerodynamic calculation methods N80-33618
The theory of two dimensional separated flows
[RAE-LIB-TRANS-2002] N80-33697
A rapid implicit-explicit solution to the two-dimensional time dependent incompressible Navier-Stokes equations
[NASA-CR-3330] N80-33718

U

U.S.S.R.
Non-quadratic nomography, chapter 2
[BLL-RTS-12290] N80-34186
U.S.S.R. SPACE PROGRAM
USSR Report: Space Biology and Aerospace Medicine, volume 14, no. 4, 1980
[JPRS-76415] N80-34058
UH-1 HELICOPTER
A NASTRAN investigation of simulated projectile damage effects on a UH-1B tail boom model N80-33791
ULTRAHIGH FREQUENCIES
Precision I-band DME tests
[AD-A089053] N80-33388
Identifications and forecasting of the potential for the occurrence of extended-range VHF-UHF transhorizon propagation from synoptic-scale data N80-33630
ULTRASONIC RADIATION
Non-specular ultrasonic bounded beam transmission through solid plates N80-34214
ULTRASONIC WAVE TRANSDUCERS
Ultrasound level-meter for measuring propellant levels in Ariane tanks in its first and second stages N80-33615
ULTRAVIOLET RADIATION
IMP 8. Volume 1: EM field experiment
[NASA-CR-160023] N80-33450
IMP-8. Volume 2: Scientific section — Bibliography
[NASA-CR-160024] N80-33451
ULTRAVIOLET SPECTROMETERS
The ONERA vacuum ultraviolet spectrograph and its use for the study of surface layers in titanium and its alloys N80-33617
ULTRAVIOLET SPECTROSCOPY
Spectroscopy of the Mars airglow from Mariner 9 ultraviolet spectrometer data N80-34317
UNCOUPLED MODES
Uncoupling approximation in fluid-structure interaction problems with cavitation
[AD-A088911] N80-33725
UNDERGROUND EXPLOSIONS
Seismic stress relaxation phenomena in an inhomogeneously prestressed medium N80-33980
UNDERWATER ACOUSTICS
Quantitative schlieren analysis of acoustic interaction with submerged plates
[AD-A089066] N80-34221
UNITED KINGDOM
Working group on fuel consumption targets
[NP-24333] N80-33910
UNSTEADY FLOW
Special Course on Unsteady Aerodynamics
[AGARD-R-679] N80-33363
Some introductory concepts based on the unsteady flow about circular cylinders N80-33364

Introduction to unsteady boundary layers N80-33365
Unsteady aerodynamics in turbomachinery N80-33369
Unsteady flows associated with helicopter rotors N80-33370
Role of unsteady aerodynamics in aircraft response N80-33371
Experimental techniques for unsteady boundary layers N80-33374
Methods for inviscid subsonic flows about unsteady aerofoils N80-33375
Prediction methods for unsteady separated flows N80-33378
Numerical solution techniques for unsteady transonic aerodynamics problems N80-33379
Pulsating flow and heat transfer in curved tubes N80-33712

UNSTEADY STATE
Experimental techniques in unsteady aerodynamics N80-33373
Analytical methods for prediction of unsteady laminar boundary layers N80-33376
Analytical methods for prediction of unsteady turbulent boundary layers N80-33377

UPPER SURFACE BLOWING
Study for conceptual design of VEO, VTOL exhaust nozzle [NASA-CR-152386] N80-33387

UPWELLING WATER
The Transfer of Pollutants in Two Southern Hemispheric Oceanic Systems [REPT-39] N80-33661

URANIUM
Uranium resources: A review of estimation methodologies [PB80-193725] N80-33820

URBAN RESEARCH
Methodology for the research of air pollution in urban areas N80-33834

URBAN TRANSPORTATION
Overview of escalator applications in rail transit [NASA-CR-163633] N80-34296

USER MANUALS (COMPUTER PROGRAMS)
Digital Avionics Information System (DAIS): Life cycle cost impact modeling system Reliability, Maintainability, and Cost Model (RMCM): User's guide [AD-A089045] N80-33405
Shuttle OFT Level C navigation requirements [NASA-TM-8221] N80-33457
Voice response system statistics program, operational handbook [AD-A089109] N80-34031
Users' guide for the tabular display report generator program (TABDIS) [NASA-TM-82211] N80-34146

USER REQUIREMENTS
Experimental work place for the EBOSIPES research project [DFVLR-MITT-79-02] N80-34122
Evaluation of precedence criteria for project scheduling under resource constraints [AD-A089070] N80-34282

UTILITIES
MOD-2 wind turbine farm stability study [NASA-CR-165158] N80-33862
Rankine bottoming cycle safety analysis [DOE/ET-15445/T1] N80-33912

V

VACUUM APPARATUS
La Recherche Aerospatiale, Bi-monthly Bulletin no. 1980-1 [ESA-TT-651] N80-33613

VACUUM CHAMBERS
In situ experiments in the 1 MV electron microscope. Part 1: Feasibility and methodology N80-33618

VALENCE
The determination of uni and tri valent gold in acid gold baths [BLL-RTS-12157] N80-33504

VALLEYS
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands — Germany and Switzerland [E80-10228] N80-33829

VANADIUM ALLOYS
Pilot plant forging of hydrogenated Ti-6Al-4V [AD-A089107] N80-33658

VANADIUM COMPOUNDS
Study of strain distribution in helium implanted vanadium three silicon by the divergent X-ray beam method N80-33548

VAPOR PHASES
Homogeneous vapor phase nucleation of large polar molecules under Limiting experimental conditions: High temperatures, low pressures, and long growth times — cloud chamber studies N80-34224

VAPOR PRESSURE
Determination of atmospheric water vapor from dewpoint measurement [PB80-197189] N80-34039
Climatic maps of the sea surface-air difference in vapour pressure and in potential temperature over the eastern Indian Ocean [AD-A089022] N80-34050

VAPORIZING
On the microwave interaction with matter and microwave breakdown of air [AD-A089806] N80-33656
Vaporization of droplets in premixing chambers [NASA-CR-163616] N80-33714

VAPORS
Research on vapor cloud explosions and related phenomena in Canada N80-33583

VARIANCE (STATISTICS)
Interval estimation, ranking and selection procedures N80-34197

VARIATIONS
Low frequency temperature fluctuations in the upper 400 meters of the central North Pacific N80-34042
Geologic implications of regional scale variation in lunar crater shape. Fourier crater shape analysis N80-34312

VECTOR ANALYSIS
Vector-potential flow in relativistic beam diodes [AD-A089135] N80-33694
Stochastic network with recourse N80-34158

VECTOR SPACES
Torsion theory and modules of finite length N80-34173
On the asymptotic analysis of Griffiths' period mapping N80-34174

VELOCITY DISTRIBUTION
Reverse pseudo-unsteady aerodynamic calculation methods N80-33616
Doppler velocimeter for laser accelerated targets [AD-A089134] N80-33739

VELOCITY MEASUREMENT
Doppler velocimeter for laser accelerated targets [AD-A089134] N80-33739
Selective reflection of light at a solid-gas interface and its application N80-34244

VENTURI TUBES
Progress with a new velocity electric precipitator the Electro-Dynamic Venturo (EDV) N80-33941

VENUS (PLANET)
Planetary radar N80-33445

VERTICAL TAKEOFF AIRCRAFT
VASCOMP 2. The V/STOL aircraft sizing and performance computer program. Volume 6: User's manual, revision 3 [NASA-CR-163639] N80-33401

VERY HIGH FREQUENCIES
Identifications and forecasting of the potential for the occurrence of extended-range VHF-UHF transhorizon propagation from synoptic-scale data N80-33630

VERY LONG BASE INTERFEROMETRY
ORION S-band data acquisition for S-Y calibration — radio interferometer networks N80-33432

VIBRATION
Elastic plate vibrations by boundary integral equations. Part 1: Infinite phase [AD-A089105] N80-33806

VIBRATION EFFECTS
Influence of the environmental conditions on a quartz resonator [RAE-LIB-TRANS-1897(5207)] N80-33673

VIBRATION TESTS
The Shock and Vibration Digest, volume 12, number 8 [AD-A086658] N80-33758
Equivalence techniques for vibration testing N80-33760
Study of the internal mechanics of space photovoltaic generators N80-33878

VIBRATIONAL SPECTRA
High temperature gas energy transfer [AD-A089129] N80-34235
Construction and testing of an ion photofragment momentum spectrometer [AD-A086753] N80-34238

VIBRATIONAL STRESS
Investigation of vibration reduction through structural optimization [AD-A088917] N80-33403

VIBRATORY LOADS
Analysis and correlation of test data from an advanced technology rotor system — helicopter performance prediction [NASA-CR-152366] N80-33351

VIDEO COMMUNICATION
AN/R-8 Doc communications system and ground terminals [CRC-TN-704-E] N80-33649

VIDEO DATA
In situ experiments in the 1 MV electron microscope. Part 1: Feasibility and methodology N80-33618
DCT/DPCM processing of NTSC composite videosignal N80-33635
Interfield hybrid coding of NTSC component video signals N80-33636
A quantitative evaluation of LANDSAT for monitoring suspended sediments in a fluvial channel N80-33823

VIDICONS
Meeting of the IRIS specialty group on infrared detectors, volume 1 [ERIM-139600-3-X(II)] N80-34241

VIKING MARS PROGRAM
Orographic effects in the atmospheres of other planets — Viking Mars observations N80-33822

VINYL POLYMERS
Preparation of homogeneous living polyvinyl gels with application to solvent purification [AD-A088883] N80-33574

VIRTUAL PROPERTIES
Determination of atmospheric water vapor from dewpoint measurement [PB80-197189] N80-34039
Effects of magnification and visual accommodation on aimpoint estimation in simulated landings with real and virtual image displays [NASA-TP-1635] N80-34099

VISCOPLASTICITY
Finite element analysis for elasto visco-plastic materials N80-33770

VISCOUS FLOW
A comprehensive investigation into the supersonic viscous flow about a slender cone at high angle of attack: Experimental and theoretical results N80-33344
Experimental techniques for unsteady boundary layers N80-33374
Viscous flow near a sphere under surface gravity waves N80-33701
A model of wind-forced viscous circulation near coastal boundaries N80-34044

VISIBILITY
Military weather calculations for the NATO theater: Weather and Warplanes 8 [AD-A086549] N80-34033
Aerosol modelling for optical weather [AD-A086563] N80-34034
Experiments concerning categorical forecasts of open-ocean visibility using model output statistics [AD-A088790] N80-34035
Automation of visual weather observations [AD-A086661] N80-34037
A method of measuring the visibility of military objects [RAE-LIB-TRANS-1981(5207)] N80-34242

VISUAL AIDS
Aids for improving vision in white-out [AD-A088726] N80-34094

VISUAL CONTROL
Effects of magnification and visual accommodation on aimpoint estimation in simulated landings with real and virtual image displays [NASA-TP-1635] N80-34099

VISUAL PERCEPTION
Pilot/vehicle model analysis of visual and motion cue requirements in flight simulation — helicopter hovering
[NASA-CR-3312] N80-33398
Aids for improving vision in white-out
[AD-A088726] N80-34094
Effects of magnification and visual accommodation on aimpoint estimation in simulated landings with real and virtual image displays
[NASA-TP-1635] N80-34099
Development of neurophysiological and behavioral metrics of human performance
[AD-A087840] N80-34100
VOCAL CORDS
A study of human throat-wall and vocal tract from input/output measurements N80-34091
VOICE COMMUNICATION
Methods of digital speech signal transmission
[BLL-RDL-TRANS-3798-(7737.470)] N80-33622
Voice response system statistics program, operational handbook
[AD-A089109] N80-34031
Synthesized voice approach callouts for air transport operations
[NASA-CR-3300] N80-34098
Automated flight plan filing by simulated voice recognition
[AD-A089138] N80-34105
VOICE DATA PROCESSING
Syncompex: A voice processing system for low cost HF radio telephony
[CRC-1316-E] N80-33648
Automated flight plan filing by simulated voice recognition
[AD-A089138] N80-34105
VOLATILITY
Source emission measurements of volatile organic chemicals
[PB80-196518] N80-33974
VOLCANOES
A sensitivity analysis of volcanic aerosol dispersion in the stratosphere — Mt. Fuego, Guatemala eruptions
[NASA-CR-163606] N80-33926
VORTEX BREAKDOWN
On the swelling of rolled up vortex surfaces and the breakdown of the vortex core for slender wings
[NASA-TM-75862] N80-33946
VORTEX RINGS
A numerical study of motion and spindown characteristics of an isolated cyclonic oceanic vortex N80-34045
VORTICES
On the swelling of rolled up vortex surfaces and the breakdown of the vortex core for slender wings
[NASA-TM-75862] N80-33946
Coherent structures in the similarity region of a two-dimensional turbulent jet: A vortex street
[AD-A088750] N80-33720
Tropical cyclone genesis: Numerical modeling inferences N80-34016
A numerical study of motion and spindown characteristics of an isolated cyclonic oceanic vortex N80-34045
VOYAGER 1 SPACECRAFT
Mission operation report: Voyager program Voyager 1 encounter at Saturn November 12, 1980
[NASA-TM-82217] N80-33426
Voyager encounters Jupiter
[NASA-CR-163607] N80-34318
Voyager 1: Encounter with Saturn
[NASA-NEWS-RELEASE-80-159] N80-34324
VOYAGER 2 SPACECRAFT
Voyager encounters Jupiter
[NASA-CR-163607] N80-34318

W

WAFERS
Research on low temperature, directed energy processing of very large scale integrated structures
[AD-A088562] N80-33621
WAKES
Coherent structures in the similarity region of a two-dimensional turbulent jet: A vortex street
[AD-A088750] N80-33720
WALL FLOW
Selective reflection of light at a solid-gas interface and its application N80-34244
WASTE DISPOSAL
Ground water monitoring strategies to support community management of on-site home sewage disposal systems N80-33826
Controlling hazardous wastes research summary
[PB80-194202] N80-33970
Assessment of alternative strategies for sludge disposal into deep ocean basins off southern California
[PB80-192990] N80-33971
WASTE ENERGY UTILIZATION
Cogeneration Technology Alternatives Study (CTAS). Volume 4: Energy conversion systems
[NASA-CR-159768] N80-33859
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 1: Coal-fired nocogeneration process boiler, cection A
[NASA-CR-159770-PT-1] N80-33860
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 2: Residual-fired noccgeneration process boiler
[NASA-CR-159770-PT-2] N80-33861
Energy conservation-air pollution abatement project N80-33939
Stack gas reheat evaluation
[PB80-196850] N80-33980
WASTE UTILIZATION
Regenerations of critical process solutions relative to recoveries of valuable substances
[BLL-RTS-12141] N80-33505
International Conference on Air Pollution, volume 3
[ISBN-0-7988-1865-1] N80-33943
Municipal refuse as a fuel for power generation N80-33950
Utilization of municipal refuse as an energy source N80-33952
WATER
Techniques for examining drop size spectra in water sprays and clouds
[ARL/MECH-ENG-NOTE-375] N80-33721
WATER DEPTH
Turbid water measurements of remote sensing penetration depth at visible and near-infrared wavelength
[NASA-TM-81843] N80-33927
Low frequency sea level variability along the west coast of North America N80-34046
WATER HEATING
Optimum systems design with random input and output applied to solar water heating N80-33854
Design data brochure for a pyramidal optical solar system
[NASA-CR-161202] N80-33865
Installation package for a sunspot cascade solar water heating system
[NASA-CR-161562] N80-33866
Design package for solar domestic hot water system
[NASA-CR-161558] N80-33867
WATER LOSS
Theoretical and applied aspects of the anabiosis of microorganisms
[BLL-RTS-12350] N80-34055
WATER MANAGEMENT
A watershed information system N80-33825
WATER POLLUTION
Ground water monitoring strategies to support community management of on-site home sewage disposal systems N80-33826
Multispectral techniques for remote monitoring of sediment in water: A feasibility investigation
[PB80-198500] N80-33849
The Transfer of Pollutants in Two Southern Hemispheric Oceanic Systems
[REPT-39] N80-33961
Proceedings of the Workshop on Government Oil Spill Modeling
[NASA-CR-163640] N80-33979
WATER QUALITY
Turbid water measurements of remote sensing penetration depth at visible and near-infrared wavelength
[NASA-TM-81843] N80-33927
WATER RUNOFF
Evaluation of hydropower potential in a river basin — Prediction analysis technique N80-33856
WATER TEMPERATURE
Optimum systems design with random input and output applied to solar water heating N80-33854
WATER TREATMENT
Regenerations of critical process solutions relative to recoveries of valuable substances
[BLL-RTS-12141] N80-33505
WATER VAPOR
Sorption, transport and diatomistric studies in glassy polymers N80-33569
Determination of atmospheric water vapor from dewpoint measurement
[PB80-197189] N80-34039
WATER WAVES
Spectral growth and nonlinear characteristics of wind waves in Lake Ontario
[PB80-193261] N80-33850
Wave information study for United States coastlines. Report 1: Surface pressure field reconstruction for wave hindcasting purposes
[AD-A089150] N80-34029
Ocean wave sensing. Citations from the NTIS data base
[PB80-812878] N80-34053
WATERSHEDS
A watershed information system N80-33825
WAVE DISPERSION
Cosmic ray propagation and instabilities N80-34334
WAVE EXCITATION
Excitation of spin waves at magnetic domain walls N80-34213
WAVE FRONT RECONSTRUCTION
Wave information study for United States coastlines. Report 1: Surface pressure field reconstruction for wave hindcasting purposes
[AD-A089150] N80-34029
WAVE FRONTS
Wavefront deconvolution studies
[AD-A088548] N80-34278
WAVE INTERACTION
The detection of atmospheric gravity waves by means of the wave interaction experiment N80-33969
Quantitative schlieren analysis of acoustic interaction with submerged plates
[AD-A089066] N80-34221
Three wave nonlinear interactions in dispersive media N80-34245
WAVE PROPAGATION
The effect of turbulence on wave propagation in the atmosphere: Generation attenuation and scattering N80-33629
Identifications and forecasting of the potential for the occurrence of extended-range VHF-UHF transhorizon propagation from synoptic-scale data N80-33630
The detection of atmospheric gravity waves by means of the wave interaction experiment N80-33969
Long wave trapping by a linear ridge topography
[AD-A088840] N80-34051
WAVEGUIDE FILTERS
Filter project with a planar circuit in the waveguide
[INPE-1817-RPE/185] N80-33680
WAVEGUIDES
Filter project with a planar circuit in the waveguide
[INPE-1817-RPE/185] N80-33680
Impact oscillator waveguides
[INPE-1816-RPE/184] N80-33682
Stimulated emission processes from free electrons N80-33732
WAVELENGTHS
Interaction of short wavelength laser radiation with spherical shell targets
[KMSF-U-953] N80-33741
Turbid water measurements of remote sensing penetration depth at visible and near-infrared wavelength
[NASA-TM-81843] N80-33927
WEAPON SYSTEMS
Responsiveness and configuration control for embedded computer software
[AD-A088723] N80-34155
WEAR
The use of current-less (chemical) nickel-plating in vacuum-and-precision- engineering
[BLL-RTS-12025] N80-33525
Directional solidification of nonoxide eutectics
[AD-A088565] N80-33557

WEATHER
Military weather calculations for the NATO theater: Weather and Warplanes 6
[AD-A088549] N80-34033
Automation of visual weather observations
[AD-A088881] N80-34037
WEATHER FORECASTING
The United States space observation policy
[NASA-TM-76373] N80-33425
Climatological relationships of severe duststorms in the Great Plains to synoptic weather patterns: A potential for predictability
[NASA-CR-163626] N80-34022
Workshop for Forecasting Droughts in Northeast Brazil
[INPE-1739-RPE/138] N80-34027
Aerosol modeling for optical weather
[AD-A088563] N80-34034
NMC model performance in the Northeast Pacific
[PB80-196033] N80-34038
The Federal Plan for Meteorological Services and Supporting Research, fiscal year 1981
[PB80-199492] N80-34041
WEDGES
Note on the energy release rate for a crack starting from the apex of a wedge
[AD-A089116] N80-33805
WEIGHTING FUNCTIONS
Two dimensional smoothing of a vector Laplacian random field with application to geodesy N80-33982
MAPS image compression
[AD-A088763] N80-34153
WEIGHTLESSNESS
USSR Report: Space Biology and Aerospace Medicine, volume 14, no. 4, 1980
[JPRS-76415] N80-34058
Cardiorespiratory system reactions of cosmonauts to exercise following long-term missions aboard the Salyut 6 orbital station N80-34060
Reactions to LBNP test of the crew of the Salyut 5 orbital station N80-34061
Static endurance of rats after flight aboard the Cosmos 936 biosatellite N80-34063
Comparative study of effects of weightlessness and artificial gravity on density, ash, calcium and phosphorous content of calcified tissues N80-34064
Morphological study of rat kidneys after flight aboard the Cosmos-936 biosatellite N80-34065
Template activity of chromatin DNA and the adenylate cyclase system of rat tissues following flight aboard the Cosmos-936 biosatellite N80-34067
Effect of periodic exposure to head-pelvis accelerations on a short-arm centrifuge on responses of the human cardiovascular system N80-34071
WELDED JOINTS
NASTRAN analysis of heat-transfer fluid fill pipe failure N80-33790
WELDED STRUCTURES
Correlation between segregation and cold cracking
[BLL-TRANS-4253-(9091.9F)] N80-33531
WETTABILITY
Process modifications for improved carbon fiber composites: Alleviation of the electrical hazards problem
[NASA-CR-163631] N80-33494
WHEAT
A model of plant canopy polarization response
[E80-10336] N80-33835
WHISKERS (SINGLE CRYSTALS)
The reflowing of tin-lead deposits
[BLL-RTS-12262] N80-33533
WHITEOUT
Aids for improving vision in white-out
[AD-A088726] N80-34094
WIND (METEOROLOGY)
Mountain waves and momentum flux N80-33815
WIND EFFECTS
Time series analysis of wind loadings on hyperbolic cooling towers N80-33772
Nonstationary random response of structural systems to aerodynamic wind forces N80-33775
Spectral growth and nonlinear characteristics of wind waves in Lake Ontario
[PB80-193261] N80-33850
A model of wind-forced viscous circulation near coastal boundaries N80-34044
WIND PROFILES
Measurements of boundary layer flow over a forested mountain slope N80-34018
Changes in the potential for wind energy generation due to terrain modification of the boundary-layer flow N80-34020
WIND SHEAR
Longitudinal stability and control in wind shear with energy height rate feedback
[NASA-TM-81828] N80-33416
Wind shear detection with pulse Doppler radar
[AD-A088576] N80-34032
WIND TUNNEL MODELS
Plenum response to simulated disturbances of the model and fan inlet guide vanes in a transonic tunnel
[NASA-TM-81969] N80-33418
WIND TUNNEL TESTS
A comprehensive investigation into the supersonic viscous flow about a slender cone at high angle of attack: Experimental and theoretical results N80-33944
Flow visualization study of the F-14 fighter aircraft configuration
[NASA-CR-163098] N80-33350
Analysis and correlation of test data from an advanced technology rotor system — helicopter performance prediction
[NASA-CR-152386] N80-33351
The problem of wind tunnel flow nonuniformity in free-model aircraft dynamic stability
[CSIR-NIAST-79-60] N80-33352
Rotary balance data for a typical single-engine general aviation design for an angle of attack range of 8 deg to 90 deg. 1: Low wing model C — wind tunnel tests
[NASA-CR-3200] N80-33355
Perspectives on research on LNG vapor cloud dispersion N80-33593
A digital unit for measuring unsteady pressure coefficients — in a wind tunnel N80-33619
WIND VARIATIONS
Circulation seasons in the Northern Hemisphere and the changes in their duration in the twentieth century
[BLL-TRANS-1455-(9022.54)] N80-34014
WINDMILLS (WINDPOWERED MACHINES)
WIND: Computer program for calculation of three dimensional potential compressible flow about wind turbine rotor blades
[NASA-TP-1729] N80-33357
The aerodynamics of contra-rotating axial flow wind power turbines
[CSIR-ME-1636] N80-33868
WINDPOWER UTILIZATION
Oversight: Wind energy program
[GPO-51-382] N80-33872
WINDPOWERED GENERATORS
MOD-2 wind turbine farm stability study
[NASA-CR-165156] N80-33862
The aerodynamics of contra-rotating axial flow wind power turbines
[CSIR-ME-1636] N80-33868
Oversight: Wind energy program
[GPO-51-382] N80-33872
WING FLOW METHOD TESTS
Experimental unsteady aerodynamics of conventional and supercritical airfoils — conducted in the Ames 11 foot transonic wind tunnel
[NASA-TM-81221] N80-33345
WING LOADING
Fatigue testing of vampire wings
[ARL/STRUC-REPT-378] N80-33399
WING PROFILES
Fatigue testing of vampire wings
[ARL/STRUC-REPT-378] N80-33399
WINGS
Circulation Control Wing (CCW) Flight Tests N80-33339
WINTER
Dynamic transport of inert tracers by growing baroclinic and stationary planetary waves in the lower stratosphere of the Northern Hemisphere in winter N80-72986
WIRE
Civil helicopter wire strike assessment study. Volume 1: Findings and recommendations
[NASA-CR-152389] N80-33361
WOOD
Evaluation of processes for producing gasoline from wood
[DOE/PE-70048/T2] N80-33602
Oxygen/system gasification of wood
[PNL-3353] N80-33605
WRINKLING
The twisting and stretching of a nonlinear annulus including the effect of wrinkling N80-33764

X

X RAY DIFFRACTION
X-ray diffraction study of the structure of boron in vapor-deposited boron fibers N80-33494
Effects of ultra-high pressures on methanol, ethanol, calcium oxide, rutile, cassiterite, and germanium dioxide N80-33515
Accuracy in powder diffraction: Proceedings of a symposium
[PB80-200488] N80-34272
X RAY FLUORESCENCE
Correction, correlation, and theoretical consideration of lunar X-ray fluorescence intensity ratios N80-34315
X RAY SCATTERING
Accuracy in powder diffraction: Proceedings of a symposium
[PB80-200488] N80-34272
Research in general physics, plasma dynamics, and communication sciences and engineering
[RLE-PR-122] N80-34338
X RAY SOURCES
WO 2059-247: An unusual high redshift X-ray cluster
[NASA-CR-163619] N80-34307
X RAY STRESS ANALYSIS
Study of strain distribution in helium implanted vanadium three silicon by the divergent X-ray beam method N80-33548
X RAYS
Radiation damage in high voltage silicon solar cells N80-33889
XENON 133
Human lung ventilation, mechanics and morphology N80-34095

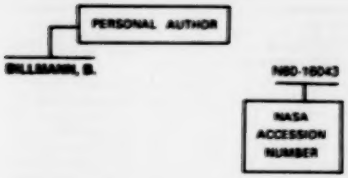
Y

YIELD POINT
The yielding behavior of unidirectional metal-matrix composites N80-33551

Z

ZINC COATINGS
The diffusion of copper into gold coatings at elevated temperatures
[BLL-RTS-12292] N80-33535
Resistance to corrosion of chromated zinc coatings
[BLL-RTS-12304] N80-33536
Chromating
[BLL-RTS-12344] N80-33540

Typical Personal Author Index Listing



Listings in this Index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

ABDEL-MALEK, L. L. N80-33654
ABRAHAMSON, A. L. N80-34216
ADAMS, N. G. N80-34001
ADAMS, T. R. N80-33572
ADAMSON, A. W. N80-33521
ADAMSON, T. C., JR. N80-33360
ADCOCK, C. N80-33396
ADELMAN, H. N80-33606
ADELMAN, H. M. N80-33715
ADLER, R. J. N80-34230
AICHER, W. N80-33757
AIKIN, A. C. N80-34006
AKHOURY, R. N80-34274
AKYUZLU, K. M. N80-33707
AL-TAYYIB, A. H. J. N80-33776
ALBRECHT, W. N80-33643
ALI, A. W. N80-33656
ALLEN, H. C. N80-33874
ALLEN, J. N80-34338
ANDERSON, C. C. N80-34095
ANDERSON, C. L. N80-34268
ANDERSON, D. L. N80-33993
ANDERSON, D. L. T. N80-33821
ANDERSON, P. N80-34005
ANDERSON, T. O. N80-33579
ANDONIAN, A. N80-33810
ANDREOLI, L. J. N80-33827
ANDREWS, W. H. N80-33338
ANNEGARN, H. J. N80-33933
..... N80-33957
ANTIOCHOS, S. K. N80-34328
AOKI, K. N80-33693
ARAGAODECARVALHO, C. A. N80-34273
ARGYRIS, J. H. N80-33757
ARNOLD, D. A. N80-33748
ARNOLD, J. E., JR. N80-34020
ARONSON, J. E. N80-34143
ARTIGUE, R. S. N80-34092
ASARO, R. J. N80-33565
ASSEL, R. A. N80-34040
ATANASOV, C. N80-33742
AUBURN, J. N. N80-33461
AUER, W. N80-33902
AUFDERHEIDE, K. H. N80-34225
AUGUSTIN, H. N80-33453
AVEDISIAN, C. T. N80-33709
AVILA, J. H. N80-33777

B

BABANOV, G. P. N80-34083
BABAYEVA, V. A. N80-34075
BACON, D. P. N80-33694
BADAWI, F. A. J. N80-34192
BAGGE, C. F. N80-34206
BAHR, D. W. N80-33408
..... N80-33412
BAILEY, G. C. N80-33562
BAILEY, T. N80-33436
BAILLIE, A. L. M. N80-33939
BAINES, P. G. N80-33819
BARNUM, P. M. N80-33449
BAKER, K. B. N80-34331
BAKER, W. M. N80-33987
BALASHOV, O. I. N80-34077
BALLARD, B. N80-34288
BALLHAUS, W. F. N80-33379
BAR-GADDA, O. N80-33676
BARAKAT, R. N80-34278
BARAN, H. A. N80-33405
BARKATS, G. N80-33880
BARON, M. J. N80-34004
BARON, R. N80-33502
BARON, S. N80-33398
BARONAVSKI, A. P. N80-33968
BARR, G. W. N80-34239
BARTHELEMY, R. N80-33468
BARTON, J. R. N80-33754
BASOL, B. M. N80-33853
BATES, F. S. N80-33574
BAUDIN, G. N80-33620
BAUM, J. D. N80-33464
BAUMAN, S. N80-33933
BAUSCH, W. C. N80-33828
BAXTER, D. J. N80-33733
BAYLESS, R. L. N80-33400
BEATY, D. W. N80-34313
BEAUCHAMP, W. T. N80-33877
..... N80-33900
BEBERMEIER, H. N80-33882
..... N80-33890
..... N80-33903
..... N80-34224
BECKER, C. N80-33988
BECKER, J. D. N80-33560
BECKER, J. J. N80-33366
BEDDOES, T. S. N80-33370
..... N80-33372
..... N80-33378
BEDNARCZYK, S. M. N80-33429
BEGGS, W. C. N80-33492
BEHRENS, G. P. N80-33980
BEKER, M. E. N80-34055
BELBRUNO, J. J. N80-34223
BELIC, M. R. N80-34248
..... N80-34257
BENANDER, B. A. N80-34173
BENNETT, R. A. N80-34254
BENTZ, B. L. N80-33508
BERBARI, E. J. N80-34087
BERCOVICI, S. N80-33544
BEREGOVKIN, A. V. N80-34060
BERGER, R. L. N80-33741
BERGERON, H. P. N80-33384
BERGMAN, F. J. N80-33974
BERMUDEZ, J. M. N80-33423
BERNSTEIN, E. R. N80-34271
BERTIN, J. J. N80-33477
BETZ, F. N80-33743
BEYER, K. N80-33536
BEYERS, M. E. N80-33352
BHARDWAJ, J. V. N80-33484
BIDLEMAN, T. F. N80-33978
BIENKOSEK, T. H. N80-33550
BIERFISCHER, U. N80-33901
BILLINGS, W. N. N80-33978
BINIEK, J. P. N80-33963
BISHOP, J. M. N80-33979
BITTENCOURT, J. A. N80-33994
BITTRICK, W. C. N80-33387
BLAKE, W. H. N80-34298
BLANCO, F. G. N80-34337
BLANKS, H. S. N80-33780
BLED-CHARRETON, M. N80-33453
BLOCK, S. N80-34272
BLUMENTHAL, B. N80-34204
BOETTINGER, W. J. N80-33480
BOGUS, K. N80-33883
..... N80-33903
BOGGAARD, J. N80-34242
BOOTH, M. C. N80-34314
BOROUGHS, R. R. N80-33794
BORROR, J. A. N80-34174
BORUSZEWSKI, W. N80-34185
BOSE, B. N80-34141
BOSE, S. C. N80-33982
BOUSLOG, S. A. N80-33477
BOWERSOX, D. F. N80-33755
BOYCE, J. M. N80-34301
BPITVAR, I. I. N80-34081
BRADHAM, J. H. N80-33630
BRADU, D. N80-34181
BRALEY, D. M. N80-34146
BRANDHORST, H. W. N80-33470
..... N80-33899
BRANIK, M. N80-33524
BRANNIGAN, M. N80-34201
BREHMAN, M. F. N80-33381
BRESSLER, R. D. N80-33456
BRIDGEMAN, J. O. N80-33379
BRILEY, W. R. N80-33723
BRINKMANN, P. W. N80-33698
BRISTOL, M. A. N80-33405
BROOKS, N. H. N80-33971
BROPHY, J. R., JR. N80-33476
BROSSARD, L. N80-33905
..... N80-33906
BROWN, D. H. N80-33959
BROWN, G. S. N80-33717
BROWN, H. N80-33955
BROWN, H. A. N80-34037
BROWN, R. A. N80-34321
BROWNING, K. A. N80-33814
BRUNKE, E. N80-33947
BRUSHCHKINA, R. I. N80-34070
BRUTON, R. A. N80-33399
BUCHMANN, A. P. N80-34295
BUDD, A. N80-33958
BUDNY, R. N80-33564
BUIVAN, N. A. N80-33838
BUNCE, E. T. N80-34010
BUNCE, R. C. N80-33444
BURBY, R. J. N80-33382
BURKE, W. R. N80-33668
..... N80-33873
BURROUGHS, J. W. N80-33787
BURRUS, D. N80-33408
BUSCH, G. E. N80-33741
BUTLER, C. F. N80-33826
BUTLER, J. M. N80-33570
BYRNE, J. G. N80-34267

C

CAHN, J. W. N80-33480
CAILLETAUD, G. N80-33620
CALLINAN, R. J. N80-33797
..... N80-33798
CALVY, M. N80-33880
CAMARGO, C. C. N80-34026
CAMMER, J. L. N80-34152
CAMPBELL, C. W. N80-34251
CANFIELD, T. R. N80-33764
CANNON, D. G. N80-33404
CARDOSO, H. P. N80-34185

CARLEIAL, A. B. N80-33645
CARLISLE, R. F. N80-33469
CARLSTON, F. P. N80-34253
CARPENTER, H. J. N80-33593
CARRIGAN, D. N80-34128
N80-34129
N80-34130
N80-34131
N80-34132
N80-34133
CARTA, D. G. N80-33454
CARTER, D. E. N80-33960
CARTER, L. R. N80-34140
CATHALA, M. N80-33990
N80-33993
CAVAGNARO, D. M. N80-33923
N80-33924
CERJAK, H. N80-33531
CHAIBONDSAI, S. N80-33746
CHAINER, T. J. N80-33610
CHAMBERLAIN, J. W. N80-34319
CHAMPION, P. A. N80-33981
CHANG, K. N80-33567
CHANG, Q. P. N80-34019
CHANG, R. S. N80-34247
CHANG, S. M. N80-34282
CHAO, C. Y. N80-33553
CHAPYAK, E. J. N80-33583
CHARATIS, G. N80-33741
CHATBURN, C. C. N80-33436
CHATTOT, J. J. N80-33356
CHAUVEAU, M. N80-33528
CHELTON, D. B., JR. N80-34046
CHEN, K. M. N80-33680
CHEN, P. C. T. N80-33793
CHEN, T. W. N80-33710
CHENG, P. T. B. N80-33507
CHERNOV, I. P. N80-34075
CHEVREL, M. N80-33425
CHIGIER, N. A. N80-33714
CHIOU, J. S. N80-33705
CHITTINENI, C. B. N80-33832
CHODOROW, M. N80-33688
CHONDE, Y. N80-33568
CHOU, Y. M. N80-34200
CHOVIT, A. R. N80-33492
CHOW, S. M. N80-33648
CHRISTOUX, C. N80-33619
CHRYSTALL, M. S. N80-34148
N80-34149
N80-34151
CHU, H. W. N80-34158
CHUANG, C. N80-33717
CHUNG, E. Y. C. N80-33711
CIRILLO, N. C., JR. N80-34283
CLARK, K. G. N80-33503
CLARK, P. E. N80-34315
CLEMENTS, L. L. N80-33493
CLIVER, E. W. N80-34003
CLOETE, C. E. N80-33961
CLOSS, R. L. N80-33948
N80-33949
COAKLEY, P. G. N80-34280
COE, P. L., JR. N80-33947
COFFEY, T. N80-33656
COHEN-SOLAL, G. N80-33528
COHEN, R. E. N80-33574
COHEN, S. A. N80-33564
COLE, D. M. N80-34168
COLLINI, L. W. N80-33603
N80-33604
COLOMBO, G. N80-33748
CONNER, D. W. N80-34096
CONTOS, G. N80-33677
CONWAY, R. R. N80-34317
COOK, C. O. N80-33488
COPPERSTEIN, G. N80-33694
COREY, L. E. N80-33628
CORIELL, S. R. N80-33480
CORNWELL, D. F. N80-34248
CORSON, W. D. N80-34029
COSNER, A. A. N80-33499
COSTANZA, V. N80-34203
COTHREN, B. E. N80-33663
COTTLE, R. W. N80-34154
COVERSTON, C. N80-33390
CRABB, R. L. N80-33874
N80-33891
CRABTREE, W. L. N80-33471
CRAWFORD, J. M. N80-33730
CROMBIE, R. B. N80-33402
CROW, R. B. N80-33430
CRUETTE, J. N80-33453
CURPMAN, H. J. N80-34048
CUTLER, D. J. N80-34336
CUTLER, M. M. N80-34139

D

DABABNEH, M. S. N80-34227
DACOSTAFERREIRANERI, J. A. N80-34337
DAFERMOS, C. M. N80-34278
DAIGNE, B. N80-33617
DANIELDES, J. N80-33487
DAPPERT, D. N80-33902
DARBRO, W. A. N80-34209
DARRIGO, S. R. N80-33636
DARTNELL, P. L. N80-33951
DAS, A. N80-33346
DAVIES, P. A. N80-33819
DAVIS, J. A. N80-33512
DAVIS, J. E. N80-33718
DAVIS, S. J. N80-34217
DAVIS, S. S. N80-33345
DAY, C. F. N80-33967
DAY, J. W. B. N80-33649
DAY, R. W. N80-34311
DEAGUIAR, O. D. N80-34306
DEFOE, D. N. N80-34254
DEGTYAREV, V. A. N80-34081
DEHEARTLEY, G. L. N80-33934
DEIRMENDJIAN, D. N80-34034
DEITZ, V. R. N80-33522
DEMARAIS, J. C. N80-33615
DEMIRANDA, L. B. N80-33844
DEMKO, P. R. N80-33513
DENGLER, H. N80-33505
DEOLIVEIRA, J. R. N80-33459
DEOLIVEIRAFILHO, O. B. N80-34185
DEOM, A. N80-33615
DERENNAESOUZA, C. N80-34164
DEREUS, A. T. N80-33945
DESHPANDE, G. N80-34296
DEVINCENZI, D. L. N80-34106
DEVORE, J. G. N80-33986
DHARIYAL, I. D. N80-34204
DHOORE, F. N80-33892
DICKINSON, R. E. N80-33613
DIEGERT, C. F. N80-34199
DIETERLY, D. L. N80-34097
DIMAGGIO, F. L. N80-33725
DOBES, K. N80-34122
DOBROWOLNY, M. N80-33748
DODDS, W. J. N80-33412
DOE, R. N80-33375
DOE, R. H. N80-33380
DOLPH, C. L. N80-34191
DONAT, R. C. N80-33765
DONNELLY, R. E. N80-34011
DORN, H. C. N80-33520
DOROSHEV, V. G. N80-34081
DOWELL, E. H. N80-33358
DOWGIALLO, E. J., JR. N80-34297
N80-34298
DOWNEY, D. M. N80-33545
DOZIER, J. N80-33636
DRAPPIER, H. N80-33528
DREYER, J. A. N80-33942
DROBMAN, J. H. N80-34109
DRUMMER, D. M. N80-33559
DUBROVINA, N. I. N80-34068
DUDEWICZ, E. J. N80-34204
DULIKRAVICH, D. S. N80-33957
DUMANOV, I. N80-33742
DURIKA, M. N80-33942
DURAND, J. F. N80-33624
DUNCAN, M. J. N80-34309
DUNLAP, H. L. N80-34268
DUNN, W. R. N80-33415
DUPUY, R. N80-33624
DURKE, W. J. N80-34005
DURNOVA, G. N. N80-34081
DUTKIEWICZ, R. K. N80-33938
DUTRA, L. V. D. N80-33940

E

EBELING, W. D. N80-33901
ECKERLE, K. L. N80-34256
ECKHOFF, R. K. N80-33992
ECKSTROM, C. V. N80-33993
EDWARDS, B. N80-33996
EGOLF, T. A. N80-34217
EHRLICH, A. C. N80-33562
ELCHAK, T. L. N80-34190
ELMITWIY, M. R. N. N80-33611
ELPINER, L. I. N80-34077
ENDO, A. N80-34135
ENDRES, B. N80-33537
ENGLANDER, I. N80-34031
ENSSLIN, N. N80-33755
EPPLER, D. T. N80-34312
ERTELT, H. J. N80-33757
EVANS, R. H. N80-33434
EVANS, W. E. N80-33731
EVERSTINE, G. C. N80-33795
EWAN, J. N80-33888

F

FALK, T. J. N80-33959
FARADAY, B. J. N80-33695
FEAGIN, J. M. N80-34229
FEDORUK, A. G. N80-34069
FELL, P. J. N80-33991
FELLBAUM, K. N80-33622
FERENCZY, N. N80-33672
FERGUSON, P. N80-33895
FERNADEZ, M. N80-33511
FERRELL, K. R. N80-33406
FETZER, J. C. N80-33510
FIELDHOUSE, E. B. N80-33960
FILHO, L. G. M. N80-34027
FINGERHUT, W. A. N80-34016
FINKE, R. C. N80-33466
FISHER, L. H. N80-33975
FITZGERALD, T. P. N80-34252
FLUEGGE, W. N80-33756
FODOR, J. N80-33885
FOO, E. C. N80-34043
FORD, D. W. N80-33966
FOSS, W. E., JR. N80-33342
FOURIE, J. H. N80-34211
FOWLIS, W. W. N80-33992
FOX, G. L. N80-33788
FOX, S. C. N80-34056
FRASER, R. C. N80-33781
FREDERKING, T. H. K. N80-33717
FREDLEY, J. E. N80-33722
FREEMAN, D. E. N80-33492
FRIEDRICH, G. N80-33887
FRIESEMA, S. E. N80-33446
FRITZ, G. N80-33483
FRUEHOLZ, R. P. N80-33523
FUENMAYOR, F. J. N80-34305
FULLER, H. I. N80-33930
FULLER, J. H. N80-33421
FURG, C. D. J. N80-33679
FUTTERER, A. T. N80-33791

G

GADEGBEKU, C. B. K. N80-33771
GAFFAROV, A. G. N80-34075
GALLAGER, R. G. N80-34159
GALLOP, L. N80-33905
GALPIN, J. S. N80-34179
GALVAO, B. D. M. C. N80-33647
GAROFALO, F. J. N80-33751
GAROW, J. N80-33801
GARY, B. L. N80-33428
GAUTAM, S. R. N80-34245
GAUTHIER, J. M. N80-33623
GAYDA, J., JR. N80-33551
GAZENKO, O. G. N80-34058
GEDWILL, M. A. N80-33556
GEERS, T. L. N80-33808
GEIGER, W. N80-33586
GEISLER, J. E. N80-33992
GEISSLER, W. N80-33368
GELBWACHS, J. A. N80-33523
GENT, P. R. N80-33816
GENTRY, G. L., JR. N80-33347
GENTY, B. N80-33618
GEORGIYEVSKIY, V. S. N80-34060
N80-34073

GERA, J. N80-33416
GERLAUGH, H. E. N80-33859
GERSING, J. N80-34121
GERSTBERGER, H. A. N80-33533
GEVECI, T. N80-34180
GHIZONI, C. C. N80-33681
GIBSON, E. D., ... N80-34257
GILET, M. N80-34013
GILLANDERS, M. N80-33885
GILLES, D. L. N80-33488
GILMORE, F. R. N80-33593
GJEVIK, B. N80-33620
GLASER, J. M. N80-33405
GLOSS, B. B. N80-33418
GOCLOWSKI, J. C. N80-33405
GODWIN, R. O. N80-33740
GOELZ, W. N80-33903
GOENKA, P. K. N80-33766
GOERGENS, B. N80-33883
GOGUSH, L. V. N80-33697
GOLD, S. H. N80-33739
GOLDHAMMER, L. J. N80-33696
GOLDREICH, P. N80-34326
GOLDSCHMIDT, V. W. N80-33720
GOLDSTEIN, S. A. N80-33694
GOLEMBKA, H. N80-33537
GOLESTAANI, S. J. N80-34159
GOLOBOV, P. N80-33742
GOLUBEV, V. S. N80-34026
GORMAN, R. W. N80-33908
GOSSMANN, H. N80-33829
GOYAL, R. K. N80-33699
GRAVELLE, A. N80-33619
GRAVES, J. N80-33475
GRAY, J. L. N80-33516
GREDEL, J. N80-34116
GREENHALL, C. A. N80-33440
GREENLEAF, J. E. N80-34058
GREENWALD, A. N80-33621
GREENWELL, R. A. N80-34252
GREGORY, G. L. N80-33928
GROSS, J. L., III N80-33767
GROSSI, M. D. N80-33748
GROTE, H. H. N80-34039
GROVER, A. N80-33662
GRUBB, J. L. N80-33343
GUALDONI, R. A. N80-33472
GUILLET, L. N80-33623
GUIMONT, J. M. N80-33598
GULKIS, S. N80-33428
N80-33429
N80-33431
GUNDERSON, E. C. N80-34095
GUPTA, N. K. N80-33461
GURLAND, J. N80-33565
GURNEY, F. J. N80-33556
GURTIN, M. E. N80-33902
GUSEVA, Y. V. N80-34062
GUTSCHE, B. N80-33959
GUY, C. R. N80-33395
GYURDZHIAN, A. A. N80-34069

H

HAAS, J. E. N80-33410
HABERCOM, G. E., JR. N80-33809
HACKER, M. J. N80-33506
HAFTKA, R. T. N80-33715
HAGER, R. J. N80-34269
HALL, M. D. N80-33851
HALLIDAY, E. C. N80-33947
HALSKI, L. N80-34054
HAM, D. G. N80-33605
HAMILTON, H. H., II N80-33719
HAMILTON, S. N80-33601
HAMMER, J. M. N80-33735
HAMPSON, R. F., JR. N80-34009
HAN, L. S. N80-33489
HAN, S. T. N80-33447
HANCOCK, G. J. N80-33364
N80-33367
N80-33371
N80-33375
HANKE, G. N80-33689
HANLEY, G. M. N80-33869
HANSEN, C. R. N80-34252
HANSON, H. W. N80-33403
HARAKI, K. S. N80-33509
HARANO, S. N80-33784
HARE, J. R., JR. N80-33968
HARNEY, R. C. N80-33736
HARPOLE, G. M. N80-33696
HARRISON, C. G. A. N80-33833
HARTLEY, R. M. N80-33361
HARWARD, C. N. N80-33998
HASHIN, Z. N80-33500
HASKINS, J. F. N80-33496
HATZE, H. N80-34147
HATZOPOULOS, J. N. N80-33976
HAUSER, C. H. N80-34108
HAWKING, D. M. N80-34179
HAWKINS, D. M. N80-34183
N80-34186
HAYES, K. C. N80-34161
HEBBLEWAITE, T. N80-33488
HECKMAN, R. N80-33685
HEDJI, S. N80-33695
HEDRICH, H. D. N80-33534
N80-33538
HEGARTY, R. F. N80-33981
HEHL, F. W. N80-34279
HEINICHEN, D. N80-33937
N80-33945
HEISS, W. D. N80-34182
HENDRICKSON, B. E. N80-33737
HENNING, B. N80-33488
HENZ, J. F. N80-34022
HEPPENHAUSEN, J. N80-33525
HERAKOVICH, C. T. N80-33495
HERNANDES, J., JR. N80-33419
HERRMAN, D. T. N80-33442
HERRMANN, R. N80-34114
HIBBITS, D. G. N80-34107
HICKMAN, A. P. N80-34270
HIDE, R. N80-33811
HIER, R. G. N80-34304
HIGGINSON, R. F. N80-33925
HIKITA, T. N80-33589
HILL, S. G. N80-33497
HILZINGER, J. B. N80-33351
HINKLE, R. L. N80-33391
HINRICHSEN, E. N. N80-33852
HIRSCH, E. H. N80-33572
HIRSHBURG, R. I. N80-33703
HIRST, A. N80-34050
HIRZINGER, G. N80-34119
HNAT, J. A. N80-33690
HO, K. B. J. N80-34007
HODGES, D. H. N80-33777
HOELL, J. M., JR. N80-33998
HOGG, N. G. N80-33817
HOGGATT, J. T. N80-33489
HOLLOWAY, D. R. N80-33901
HOLYER, R. J. N80-33849
HOMES, J. C. N80-34008
HONMA, S. N80-33575
HOOKWAY, R. J. N80-34293
HOPEWELL, W. D. N80-34222
HORTON, J. A., JR. N80-33547
HOSFORD, J. N80-33488
HOUSE, E. E. N80-33489
HOWARD, T. W. N80-33847
HOWLE, W. M. N80-33463
HSIA, Y. T. N80-33744
HSU, J. C. C. N80-34145
HSUE, S. T. N80-33795
HU, P. W. N80-33753
HUANG, H. N80-33689
HUBBARD, C. R. N80-34272
HUBER, P. W. N80-33409
HUBER, T. P. N80-33824
HUBER, W. N80-34084
HUET, M. N80-33624
HUNDEMANN, A. S. N80-33607
N80-33917
N80-33918
N80-34053
HUNTER, J. J. N80-34207
HURWITZ, M. M. N80-33684
N80-33783
HUSCHKE, R. E. N80-34033
HY, V. S. N80-33631

I

IBARAKI, R. N80-33685
IGNIZIO, J. P. N80-34190
ILES, P. A. N80-33693
ILYUCHENOK, R. Y. N80-34068
INOUE, N. N80-33855
IRVINE, A. P. N80-33435
ISAKHANOV, A. L. N80-34083
ISANG, T. H. T. N80-33577
ISHIGURO, T. N80-33543
ISOM, L. E. N80-33573
IVES, B. D. N80-33950

J

JACKSON, G. A. N80-33971
JACKSON, K. W. N80-33702
JACOBSON, D. H. N80-34212
JAFFE, W. J. N80-34307
JANSSEN, M. A. N80-33428
N80-33429
JECK, R. K. N80-34036
JENKINS, S. A. N80-33701
JEPSON, D. N80-33951
JOHNSON, D. L. N80-34239
JOHNSON, J. C. N80-33497
JOHNSON, R. R. N80-33741
JOHNSON, S. S. N80-33755
JOHNSON, W. N80-33349
JOHNSON, W. S. N80-33778
JONES, C. E. N80-34269
JONES, J. C. N80-33967
JONES, R. N80-33797
N80-33798
JORY, H. N80-33695
JOSEPH, A. F. N80-33940
JOST, G. S. N80-34339
JOYCE, R. N80-33600
JULLENS, R. A. N80-34268
JUNIOR, N. M. N80-34185

K

KAASE, H. N80-33854
KAJI, T. N80-34262
KAKURIN, L. I. N80-34060
KALINICHENKO, V. V. N80-34060
KALINOWSKI, A. J. N80-33795
KAMANGER, F. A. N80-33836
KAMATH, G. S. N80-33888
KAMEL, M. M. N80-33584
KAMIOKA, Y. N80-33717
KANE, R. P. N80-33518
KANG, Y. Q. N80-34042
KANNAN, R. N80-34142
KANTOR, I. J. N80-34024
KARIYAWASAM, H. C. N80-33858
KARL, H. J. N80-34084
KARLSEN, L. K. N80-33253
KASAHARA, A. N80-33612
KASSING, D. N80-33904
KASSNER, I. W. N80-33540
KASYAN, I. I. N80-34072
KATERLE, H. J. N80-34115
KATKOVSKIY, B. S. N80-34073
KAWABATA, J. N80-33578
KEARNEY, L. N80-33885
KELLY, W. L., IV N80-33463
KENYON, C. S. N80-33674
KERAMIDAS, G. A. N80-34277
KERR, J. R. N80-33496
KERR, W. R. N80-33558
KERSTENS, J. N80-33883
KEUNG, C. S. N80-33704
KHOVANSKII, F. S. N80-34167
KIM, S. T. N80-33823
KIM, Y. I. N80-33717
KIMURA, H. N80-33502
KINDESS, S. W. N80-34094
KING, M. C. F. N80-34286
KINNEY, J. A. S. N80-34094
KIRBY, G. C. N80-33810
KIRILLOVA, Z. A. N80-34061
KIRKLAND, E. J. N80-34228
KISTLER, R. H. N80-33405
KLEMP, J. B. N80-33815
KLIMOVSKAYA, L. D. N80-34082
KLOPP, W. D. N80-33555
KNAPTON, B. N80-33396
KNECHTLI, R. C. N80-33888
KNIGHTLY, W. F. N80-33860
N80-33861

KNOEDLER, A. N80-33604
KNOX, C. E. N80-33404
KOBZEV, Y. A. N80-34072
KOCH, J. R. N80-33487
KOCHEMIDOV, A. N80-33742
KOH, R. C. Y. N80-33971
KOHL, J. L. N80-33492
KOHLER, J. Y. N80-33913
KOHLS, J. B. N80-33081
KOMISSAROVA, N. S. N80-34064
KOMOLOVA, G. S. N80-34067
KONIGL, A. N80-34335
KONSTANTINOVSKAYA, L. A. N80-34068
KORELIN, N. V. N80-34040
KOROBI, A. N80-33599
KOTOVSKAYA, A. R. N80-34063
KOUBA, A. N80-33530
KOUSOUNELOS, P. N. N80-33486
KOUSKY, V. E. N80-34027
KOWALSKI, A. D. N80-33700
KOWITZ, H. R. N80-33683
KOWSZYK-GINDIFER, Z. N80-34054
KRESKOVSKY, J. P. N80-33723
KU, H. C. N80-33675
KUECHLER, G. N80-33675
KUHL, A. L. N80-33583
KUHLMAN, W. H. N80-33382
KUMAR, A. N80-33698
KUMAR, C. N80-34266
KUMAR, V. K. N80-33449
KUNG, R. M. N80-33777
KUPPERMANN, A. N80-33481
KURASI, A. N80-34112
KURYLO, J. N80-33584
KUSENBERGER, F. N. N80-33754
KUSHNER, R. J. N80-33699
KUSTOV, V. V. N80-34059
KUZNETSOVA, T. I. N80-34078

L

LAANANEN, D. H. N80-33585
LABONTE, A. E. N80-34153
LACHAISE, J. N80-33823
LADANY, I. N80-33735
LAFAYSSE, C. N80-34013
LAKSHMIVARAHAN, S. N80-34150
LALAK, J. N80-33729
LAMBERT, N. N80-33786
LAMBOURNE, N. C. N80-33373
LAMPE, M. N80-34237
LAMSON, N. N80-33652
LANCRAFT, R. N80-33098
LANGENBERG, H. M. N80-33949
LANGHORST, G. J. N80-33989
LANZIOTTI, E. N80-33532
LAPSHINA, N. A. N80-34061
LARKIN, R. J. N80-34288
LAROCHE, G. J. N80-33676
LARUE, J. C. N80-33891
LASSILEDT, R. N80-33453
LAU, K. Y. N80-34250
LAWINS, P. L. N80-33480
LAWRENCE, A. G. N80-33953
LAWRENCE, R. J. N80-33952
LEAVITT, R. P. N80-33692
..... N80-33724
LEE, H. P. N80-33795
LEE, J. H. S. N80-33583
LEE, J. M. N80-33717
LEE, K. S. N80-33632
LEE, P. R. N80-33493
LEE, R. N80-33694
LEE, S. S. N80-33486
LEGENDRE, R. N80-33614
LEHMAN, S. J. N80-33601
LEMANSKI, R. N80-34105
LEOVY, C. B. N80-33822
LEPPLA, F. B. N80-33443
LESLIE, A. C. D. N80-33933
LESLIE, N. P. N80-33420
LESTRADE, J. P. N80-34319
LETALLEC, P. G. N80-33763
LETTVIN, E. N80-34301
LEVINTHAL, E. C. N80-34057
LEW, V. N80-33921
LEWANDOWSKI, G. A. N80-33912
LEWIS, D. J. N80-33582
LEYER, J. C. N80-33595
LIEBERMAN, P. N80-33492
LIEBERT, R. N80-33729
LILLY, D. K. N80-33815
LIMAYE, P. S. N80-34213
LIN, I. H. N80-33554
LITTLE, S. A. N80-33883
LIU, P. C. N80-33850
LKHAGVA, L. N80-34074
LO, Y. L. C. N80-33681
LOEHNBERG, R. N80-33531
LONGUSKI, J. M. N80-33448
LOO, R. Y. N80-33888
LOOMIS, J. S. N80-33727
LORINCZ, D. J. N80-33950
LOTT, D. R. N80-33900
LOUBERE, P. W. N80-34047
LOUIE, D. N80-34259
LUI, H. H. H. N80-34176
LUBORSKY, F. E. N80-33580
LUCAS, P. N80-33670
LUCHT, L. A. M. N80-33839
..... N80-33841
LUKYANCHIKOV, V. I. N80-34072
LURIA, S. M. N80-34094
LUTES, G. F. N80-33439
..... N80-34250
LYON, T. F. N80-33412
LYONS, M. G. N80-33461

M

MACHINSKIY, G. V. N80-34073
MACMILLAN, N. H. N80-33498
MAHEFKEY, T. N80-33468
MAKEDONSKI, R. N80-33742
MAKEYEVA, V. F. N80-34067
MALAMAND, F. N80-33617
MALCOLM, G., N. N80-33745
MALEKI, L. N80-33478
MANONE, J. F. N80-33515
MANESKI, R. N80-34157
MANN, K. N80-34084
MANNING, J. P. N80-33480
MANU, C. N80-33788
MARGERUM, E. A. N80-33653
MARGULIES, G. N80-33481
MARKS, D. A. N80-34152
MARLIN, H. W. N80-33429
MARRAUD, A. N80-33618
MARS, P. N80-34148
..... N80-34149
..... N80-34151
MARSHALL, J. N80-33685
MARSHALL, P. M. N80-33662
MARTIN, C. S. N80-33750
MARTIN, E. L. N80-33421
MARTIN, I. M. N80-33838
..... N80-34308
..... N80-34337
MARTIN, J. J. N80-33985
MARTIN, T. H. N80-34239
MARTORELL, I. A. N80-33558
MASARIK, V. N80-33535
MASCARENHAS, N. D. A. N80-33840
MASSA, D. L. N80-34308
MASTIN, C. W. N80-34178
MATHIS, J. J., JR. N80-33928
MAUCH, H. N80-33413
MAVEC, J. N80-33600
MAYER, F. J. N80-33741
MAYHAN, J. T. N80-33685
MCBRYAR, H. N80-33473
MCCORMACK, C. G. N80-33579
MCCRACKEN, G. M. N80-33564
MCCUMBER, M. C. N80-34015
MCDONALD, H. N80-33723
MCDONALD, J. R. N80-33988
MCDOUGAL, D. S. N80-33926
MCHATTON, A. D. N80-33491
MCLALLIN, K. L. N80-33410
MCLARNON, B. D. N80-33648
MCLEAN, E. A. N80-33739
MCMULLIN, W. A. N80-33732
MCNALLY, R. N80-33411
MEAUZE, G. N80-33616
MEDLARZ, H. N80-33750
MEDRANO-B, R. A. N80-34184
..... N80-34323
MEDWIN, L. B. N80-33734
MEETEREN, A. N80-34242
MEINDL, J. D. N80-34220
MELLBY, J. R. N80-34136
MENDELSOHN, A. N80-33629
MENENTI, M. N80-33834
MENZIES, W. R. N80-33990
MEREDITH, B. D. N80-33483
MERTENS, R. N80-33892
MESSITER, A. F. N80-33300
METZGER, K., JR. N80-33659
METZGER, M. N80-33583
MEZZANOTTE, D. A., JR. N80-33552
MICHALSKI, K. A. N80-33690
MIDDLETON, J. W. N80-34023
MIKHAYLOV, V. M. N80-34060
..... N80-34073
MILLAVEC, W. A. N80-33492
MILLER, G. E. N80-33417
MILLER, R. B. N80-33437
MITAL, A. N80-34090
MITCHELL, D. H. N80-33605
MITCHELL, J. D. N80-34007
MITROVICH, D. N80-33741
MIZOI, H. N80-33529
MIZUTANI, Y. N80-33543
..... N80-33543
MODDEMAN, W. E. N80-33803
MOEN, I. O. N80-33583
MOFFITT, R. N80-33351
MOISE, S. L., JR. N80-34100
MONROE, H. M. N80-34203
MOORHOUSE, D. J. N80-33402
MORALES, G. J. N80-34261
MOREIRA-NORDEMANN, L. M. N80-33841
MORGAN, J. J. N80-33971
MORRIS, C. E. K. N80-33348
MORRIS, S. J., JR. N80-33242
MORRIS, W. D. N80-33927
MORRISON, C. A. N80-33724
MORRISON, G. H. N80-33559
MORRISON, P. J. N80-34334
MOTTET, S. N80-33896
MOURA, A. D. N80-34027
MOWRY, F. L. N80-34018
MUASHER, M. J. N80-33830
MUDGE, L. K. N80-33805
MUELA, C. A. N80-33980
MULCAY, W. J. N80-33355
MULLAN, D. J. N80-34322
MULLIN, J. P. N80-33467
MUNI, I. K. N80-33517
MUNJY, R. N80-33976
MURAMAKI, T. N80-33539
MURPHREE, J. S. N80-33997
MURRELL, M. T. N80-34332
MUSSELMAN, K. A. N80-33491

N

NAGLE-ESHLEMAN, J. N80-33758
NAGLE, W. J. N80-33857
NAKAJIMA, K. N80-33543
NARENDRA, K. S. N80-34149
..... N80-34150
NASH, P. R. N80-33341
NATAUPSKY, M. N80-33423
NAUDE, D. P. N80-33938
NAUDE, G. N80-34286
NEEDLEMAN, J. N80-33565
NEILAND, V. Y. N80-33697
NELSON, J. D. N80-33826
NERI, D. F. N80-34094
NETO, A. R. N80-34187
NEU, W. N80-34051
NEUBAUER, M. J., JR. N80-33342
NEVILLE, R. G. N80-34151
NEYNABER, R. H. N80-34234
NG, K. W. N80-34214
NICHOLSON, J. M. C. N80-33962
NICOLET, M. N80-34006
NIJS, J. N80-33892
NIKOLAYEVA, T. N. N80-34062
NIKOLOV, I. T. N80-34081
NOEL, E. F. N80-33400
NOON, D. N80-33454
NORDEMANN, D. J. R. N80-33838
..... N80-33995
..... N80-34337
NORDEMANN, L. M. M. N80-33838

NORDMANN, J. C. N80-34310
NORDQUIST, A. N80-33695
NOVEMBER, L. J. N80-34325
NYE, H. R. N80-33899
NYSTROM, D. M. N80-33460

O

OBENSCHAIN, S. P. N80-33739
OBERHOLTZER, J. D. N80-34048
OBRIEN, G. T., JR. N80-34303
ODENTHAL, J. P. N80-33747
OETTL, H. N80-34113
OHARA, L. S. N80-33737
OHARA, T. N80-33842
OLADIMEJI, M. K. N80-33762
OLDAKOWSKI, T. N80-33413
OLER, J. W. N80-33720
OLSEN, E. T. N80-33428
N80-33431
OMURA, J. K. N80-33639
N80-33640
OPJORDEN, R. N80-33985
OPPENHEIM, A. K. N80-33594
OSTERYOUNG, J. N80-33693
OSTROWSKI, A. M. N80-34189
N80-34202
OTTO, D. N80-33609
OVERLAND, J. E. N80-34038
OWEN, R. B. N80-34251
OWEN, T. B. N80-34041
OWENS, H. N80-33974

P

PACHECO, M. T. T. N80-33681
PACHT, E. N80-34333
PACHTER, M. N80-34212
PADOVA, C. N80-33259
PALASZEWSKI, S. J. N80-33708
PANAGAKOS, N. N80-34324
PANG, J. S. N80-34154
PANKOVA, A. S. N80-34085
PANTEV, T. P. N80-34081
PAPAGIANNIS, M. D. N80-34331
PAPE, R. N80-33600
PARADA, N. D. N80-34027
PARADELLA, W. R. N80-33843
PARAMASIVAM, S. N80-33794
PARISH, J. L. N80-34318
PARK, S. K. N80-33634
PARKER, J. N80-33454
PARKER, J. L. N80-33755
PARKINSON, W. H. N80-33462
PASMAN, H. J. N80-33582
N80-33590
PATCHING, C. A. N80-33399
PATTON, J. M., JR. N80-33340
PAULSON, M. R. N80-33652
PAVIA, R. E. N80-33721
PEARSON, K. H. N80-33958
PEARSON, L. W. N80-33690
PEFLEY, R. N80-33806
PEREIRA, C. S. N80-33844
PEREIRA, J. A. G. N80-34025
PETERS, W. H. N80-33810
PETITT, J. C. N80-34099
PETRIE, J. H. N80-34291
PFEIFFER, I. N80-33526
PHILLIPS, H. N80-33588
PICHA, G. J. N80-33478
PICK, G. S. N80-33361
PIERCE, A. D. N80-33362
PIERSOL, A. G. N80-33392
PINDERA, M. J. N80-33495
PINEL, S. I. N80-33749
PITTER, J. N80-33535
PLEASANT, L. G. N80-34106
PLOCIENNIK, Z. N80-34054
PLOYSONGSANG, A. N80-33635
POHL, G. N80-33874
POLICELLA, H. N80-33620
POMETOV, Y. D. N80-34073
PONOMAREV, S. I. N80-34061
POOL, A. N80-33406
N80-33407
PORUBSKA, M. N80-34243
POSTEL, H. N80-33388
POULTON, J. W. N80-34233
PRENTICE, A. J. R. N80-34320
PREUS, A. W. N80-33582
PREWO, K. M. N80-33501
PRICE, P. N80-33600
PRIDE, R. A. N80-33491
PRIEST, J. W. N80-34089
PRIESTLEY, R. R. N80-33859
PROKHONCHUKOV, A. A. N80-34084
PURI, M. L. N80-34205

Q

QUEZON, A. J. N80-33795
QUINTANA, H. N80-34307

R

RABADI, N. J. N80-33712
RABENHORST, D. W. N80-33909
RABINOVITCH, B. S. N80-34235
RADFORD, S. F. N80-34275
RADHAKRISHNA, A. V. N80-34195
RAFAL, M. D. N80-34249
RAHMAN, M. M. N80-34021
RAMOHALLI, K. N80-33494
RANADE, G. R. N80-33589
RANCOURT, J. N80-33877
RANCOURT, J. D. N80-33900
RANDLE, R. J. N80-34099
RANE, A. G. N80-33706
RANEY, J. P. N80-34218
RAPP, I. N80-33671
RAPP, R. R. N80-34033
RASCH, K. D. N80-33684
N80-33887
N80-33890
RATH, J. N80-33882
RATTEI, W. N80-34116
RAUB, C. J. N80-33534
N80-33538
N80-33539
REDFIELD, D. N80-33914
REED, D. A. N80-33772
REED, W. E. N80-33398
N80-33399
N80-33390
N80-34126
N80-34127
REGOZIN, V. N. N80-34061
REHMAT, A. G. N80-33578
REICHERT, J. D. N80-34255
REIDER, J. P. N80-33981
REIFLE, S. R. N80-34175
REIMANN, J. N80-33898
REIMHERR, G. W. N80-34194
REITER, E. R. N80-34022
RENARD, R. J. N80-34035
RENNIE, A. J. N80-33925
RENZETTI, N. A. N80-33433
RESIO, D. T. N80-34029
REX, D. N80-33901
REYER, B. H. N80-34232
RICE, J. R. N80-33565
RICE, T. S. N80-33344
RICE, W. C. N80-33848
RICH, F. N80-34005
RICHARD, D. N80-33878
RICHARDS, R. T. N80-34221
RICHTER N80-33527
RICKERT, S. E. N80-34264
RICKLEY, E. J. N80-33362
RIDLER, E., H. N80-34293
RINO, C. L. N80-33664
RINGLAND, C. P. N80-34302
RIVIR, R. N80-33414
ROACH, J. W. N80-34136
ROBINSON, G. D. N80-33965
RODRIGUES, V. N80-33644
ROGERS, V. J. N80-34292
ROGERS, W. T. N80-34226
ROMANS, J. B. N80-33522
ROSCOE, S. N. N80-34099
ROSE, L. R. F. N80-33796
ROSE, R. A. N80-33955
ROSENBERG, J. N80-33761
ROSENSTEIN, H. N80-33401
ROSENTHAL, T. E. N80-34153
ROSKAM, J. N80-34215
ROTHMAN, D. N80-34206
ROY, K. N80-33894
N80-33897
RUBENSTEIN, L. N80-34296
RUBIN, D. N80-33725
RUBIN, J. N. N80-33599
RUBLE, J. R. N80-33411
RUDOLPH, T. H. N80-34258
RUSSELL, P. B. N80-33977
RUSTAGI, J. S. N80-34185

S

SABLA, P. E. N80-33408
SACHS, I. N80-33877
SACHS, S. S. N80-34177
SAGALYN, R. C. N80-34005
SAHAL, Y. N80-33994
SAHALOS, J. N. N80-33655
SALMASI, A. B. N80-33641
SALMON, R. B. N80-34085
SAMPSON, T. E. N80-33755
SAMUEL, M. D. N80-34030
SANDER, J. N80-33643
SANDERSON, K. C. N80-33408
N80-33407
SANDLER, I. S. N80-33725
SANHER, G. E. N80-33442
SANTANA, C. E. N80-33646
N80-33647
N80-33680
N80-33682
SANZ, P. P. N. N80-33645
SARAZIN, C. L. N80-34307
SAVARY, M. N80-34125
SAVINA, S. S. N80-34014
SAVINA, V. P. N80-34078
SAXENA, H. C. N80-34120
SAXON, R. P. N80-34270
SCHAECHTER, D. B. N80-33454
SCHAEFER, M. N80-33970
SCHAFER, D. E. N80-34269
SCHEIL, G. W. N80-33974
SCHERTLER, R. J. N80-34048
SCHJVE, J. N80-33779
N80-33780
SCHILLING, R. N80-33690
SCHJELDERUP, H. C. N80-33486
SCHLICHTING, C. L. N80-34094
SCHLOSSER, A. J. N80-33458
SCHNEIDER, L. N80-34117
SCHMIDT, J. N80-33531
SCHNABL, R. N80-33524
SCHNUR, J. M. C80-33598
SCHOEN, A. H. N80-33401
SCHONHOFF, T. A. N80-33633
SCHROEDER, R. J. N80-33741
SCHULER, S. C. N80-34290
SCHULLER, F. T. N80-33749
SCHULTE, K. N80-33587
SCHULTZ, J. A. N80-33548
SCHULZ, W. D. N80-33540
SCHUTZ, C. N80-34032
SCHUTZ, R. J. N80-33548
SCHWAB, L. M. N80-33661
SCHWARZ, G. N80-34123
SCHWARZ, U. N80-34118
SCHWENK, W. N80-33541
SCIARAFFA, D. N80-34056
SCOFIELD, S. H. N80-33907
SCOLARI, S. L. N80-33881
SCOTT, M. W. N80-34269
SEAT, J. C. N80-33417
SEHRA, A. N80-33413
SEILER, W. N80-33947
SEIYAMA, T. N80-34262
SELLA, C. N80-33528
SELLSCHOP, J. P. F. N80-33957
SENADOR, R. N80-33838
N80-34337
SEPULVEDA, M. F. P. N80-34025
SEWELL, C. N80-33339
SHANKLE, R. W. N80-34327
SHARMA, A. N80-33713
SHARP, W. M. N80-34237
SHAW, R. P. N80-33808
N80-34051
SHCHIGOLEV, V. V. N80-34060

SHEN, T. N80-33752
SHEPIC, J. A. N80-33479
SHEPPARD, C. H. N80-33487
SHER, M. A. N80-33627
SHERATTE, M. B. N80-33911
SHIMAZAKI, Y. N80-33770
SHIPLEY, A. M. N80-34049
SHIPMAN, J. S. N80-33848
SHIPOV, A. A. N80-34063
SHIVASHANKARA, B. N. N80-34219
SHOCHET, E. N80-34105
SHRADA, Y. N80-34172
SHULKIN, R. L., JR. N80-34203
N80-34282
SIERAKOWSKI, R. L. N80-33759
SIGNER, H. R. N80-33749
SILIPO, G. N80-33877
SIMMONS, D. B. N80-34137
SIMON, C. G. N80-33978
SIMON, M. K. N80-33640
SIMONS, P. O. N80-34210
SIMPSON, C. A. N80-34098
SIMPSON, J. D. N80-33741
SINGH, H. N80-33775
SINGLEY, G. T., III N80-33385
SKIDMORE, F. W. N80-33721
SLAGG, N. N80-33595
SLATER, D. C. N80-33741
SLINEY, H. E. N80-33482
SMALL, T. R. N80-33909
SMIDDY, M. N80-34005
SMIRNOVA, T. M. N80-34080
SMITH, C. W. N80-33810
SMITH, D. N80-34001
N80-34097
SMITH, D. C. N80-34045
SMOOT, G. F. N80-33429
SNELLINGS, I. R. N80-34298
SNOVER, K. A. N80-33667
SNYDER, E. N80-33488
SOJKA, B. Z. N80-33654
SOKORAC, A. N80-34231
SOLOMIN, G. I. N80-34076
SOLTIS, F. S. N80-33428
SONNABEND, D. N80-33454
SORENSEN, P. D. N80-33400
SPIELMAN, B. E. N80-33667
SPILLANE, M. C. N80-34044
SRB, M. N80-33535
ST. AMOUR, T. E. N80-33514
ST.CLAIR, A. K. N80-33571
ST.CLAIR, T. L. N80-33570
STAFFORD, G. R. N80-33485
STANZIONE, K. N80-33401
STATLER, R. L. N80-33895
STAUSS, G. H. N80-33658
STEACY, P. E. N80-34144
STEINBACH, P. N80-33663
STELZRIED, C. N80-33441
STENGEL, R. F. N80-33417
STEPHANOV, S. N80-33742
STEPHENS, W. B. N80-33777
STEPHENSON, R. A. N80-33800
STEPPINOV, G. Y. N80-33697
STEVENS, D. D. N80-33348
STEVENS, J. L. N80-33983
STEWART, T. J. N80-34281
STOCKMANN, R. N80-34056
STRAUCH, R. G. N80-34032
STRIFE, J. R. N80-33501
STRIOLE, N. C. N80-34110
STROSS, W. J. N80-33561
STRUBE, G. N80-33533
STUBICAR, V. S. N80-33557
STUDHOLME, E. D. N80-33967
STURGEON, R. F. N80-33394
STURROCK, P. A. N80-34330
SUDHAKAR, V. N80-33519
SUGA, T. N80-33606
SULLIVAN, D. N80-33741
SULLIVAN, S. J. N80-33920
SULZER, M. P. N80-33989
SUMNER, J. S. N80-34171
SUSHKOV, F. V. N80-34080
SUTLIFF, T. G. N80-33343
SWAIN, P. H. N80-33830
SWANGER, M. H. N80-33769
SWANSTROM, C. W. N80-33498
SWARTZ, C. K. N80-33869
SWEEZY, W. B. N80-34032
SYMONDS, W. A. N80-33489
SYMONS, R. N80-33695
SZUSZCZEWICZ, E. P. N80-34008

T

TADJERAN, H. N80-34170
TAGHVA, S. N80-34189
TAKEDA, F. N80-34244
TAKEDA, N. N80-33759
TALAVRINOV, V. A. N80-34072
TALIA, J. E. N80-33549
TALMACHOFF, P. J. N80-34086
TANG, S. Y. N80-34234
TANNER, A. E. N80-33985
TARNG, S. H. N80-34198
TARTER, J. N80-33431
TASHPULATOV, R. Y. N80-34062
TAYLOR, L. T. N80-33520
TAYLOR, P. A. N80-33818
TAYLOR, R. M. N80-33445
TAZAKI, Y. N80-33578
TEIXEIRA, N. R. N80-33894
TELIONIS, D. P. N80-33365
N80-33374
N80-33376
N80-33377
TEMPLE, P. N80-33913
TERRY, J. L. N80-34156
TEXIER, A. N80-33623
THATCHER, R. K. N80-34280
THIELE, G. A. N80-33655
THOMAS, P. D. N80-33354
THOMAS, T. F. N80-34238
THOME, P. G. N80-33999
THOMPSON, J. F. N80-34178
THOMPSON, M. W. N80-33691
THOMSEN, A. G. N80-33625
THORNHILL, R. J. N80-33773
THOUVENIN, Y. N80-34013
TIBALDI, S. N80-33819
TIGRANYAN, R. A. N80-34067
TIKHONOVA, G. D. N80-34076
TIRIMAN, V. W. N80-33423
TITRAN, R. H. N80-33555
TIUNOV, L. A. N80-34059
TOLK, K. M. N80-33745
TOMAINE, R. L. N80-33348
TOMPKINS, R. E. N80-33994
TOPALOVA, S. T. N80-34091
TORQUATO, P. R. G. N80-34323
TORSTENSON, C. A. N80-33963
TRIELLA, T. N80-33752
TROITSKAYA, Y. N. N80-34067
TRZCINSKI, E. N80-34002
TSAI, P. J. N80-34197
TSAUR, B. Y. N80-34285
TSAY, J. N80-33568
TUAN, P. D. N80-34205
TUCCHIO, M. N80-33786
TUCKER, C. H. N80-34287
TUCKER, L. E. N80-33935
TUCKER, W. H. N80-34329
TUDE, E. A. P. N80-33680
TULLY, N. N80-33953
TUOMELA, C. H. N80-33381
TURNBOW, J. W. N80-33385
TURNBULL, M. S. N80-33958
TURNER, W. C. N80-34240
TZENG, Y. N80-34236

U

UCHIDA, Y. N80-34330
ULRICKSON, M. N80-33564
UNDERWOOD, J. H. N80-34329
UNGER, P. N80-34124
UNZ, H. N80-34215
URTIEW, P. A. N80-33595

V

VAIDYANATHAN, K. V. N80-34288
VALDOIS, M. N80-33673
VALIN, J. N80-33637
VALLE, R. N80-33618
VANDERBILT, V. C. N80-33835
VANDERELST, W. J. N80-33868
VANDEVENDER, J. P. N80-34239
VANGAASBEEK, J. R. N80-33422
VANGRIEKEN, R. E. N80-33957
VANOVERSTRAETEN, R. N80-33992
VARZYL, A. S. N80-33837
VASSILAROS, M. G. N80-33907
VECTER, L. M. N80-34201
VEMULA, N. R. N80-34091
VENTER, A. N80-34162
VENTER, G. P. N. N80-33949
VERESS, S. A. N80-33976
VICARD, J. F. N80-33941
VIDMAR, H. M. I. N80-33990
VIECHNICKI, D. J. N80-33738
VIEZEE, W. N80-33731
VILVILYAMS, I. F. N80-34071
VINCENT, C. L. N80-34029
VINH, N. X. N80-33448
VINOKUR, M. N80-34188
VIOLA, F. E. N80-34026
VODOLAZOV, A. S. N80-34060
VOGT, H. J. N80-33483
VOLOZHIN, A. I. N80-34064
VONBLOTTNITZ, F. N80-33957
VORSOLMS, S. H. N80-34286
VONTIESENHAUSEN, G. N80-34209
VONWALD, L. W. N80-33659
VROBEL, L. N80-33535

W

WAAG, W. L. N80-33421
WADE, G. O. N80-34155
WADHWA, S. K. N80-33792
WAGNER, H. G. N80-33582
WALKER, D. H. N80-33895
WALKER, S. S. N80-33677
WALLACE, D. R. N80-33684
WALLER, R. E. N80-33931
WANG, P. S. N80-33603
WANG, Y. C. J. N80-34196
WARNOCK, D. R. N80-33474
WARREN, J. N80-33387
WATKINS, R. I. N80-33728
WATSON, K. S. N80-33932
WEARE, B. C. N80-34030
WEBB, M., S.JR. N80-34052
WEBER, D. D. N80-33726
WEBER, S. L. N80-33605
WEBSTER, E. N80-33809
WEBSTER, H. A., III N80-33597
WEHDE, M. E. N80-33831
WEHOFER, S. N80-33414
WEINBERG, I. N80-33899
WEIZER, V. G. N80-33899
WELDON, D. N80-33413
WELLS, R. B. N80-33944
N80-33948
WENDLAND, B. N80-33626
WERNER, J. N80-33794
WESTON, M. N80-33638
WHANG, K. W. N80-34261
WHITAKER, A. F. N80-33963
WHITE, K. O. N80-33654
WHITE, P. W. N80-33811
WHITE, R. A. N80-34239
N80-34307
WHITEHEAD, D. S. N80-33369
WHITLOCK, C. H. N80-33927
WIGGERT, D. C. N80-33750
WILBUR, P. J. N80-33476
WILBY, E. G. N80-33392
WILBY, J. F. N80-33392
WILDE, R. C. N80-34101
N80-34102
N80-34103
N80-34104
WILKINS, G. E. N80-34287
WILKINSON, W. O. N80-33909
WILLIAMS, J. H., JR. N80-33486
WINCHESTER, J. W. N80-33933
N80-33957
WINSTON, H. N80-33502
WINTER, J. R. N80-33790
WISNIEWSKI, B. N80-33940
WISNIEWSKI, J. S. N80-33401
WITTBERG, T. N. N80-33803
WITTE, W. G. N80-33927
WITTIG, K. N80-33729

WOICESHYN, P. M. N80-34022
WOLFF, P. A. N80-34336
WOODEN, V. A. N80-33863
WOODWARD, K. A. N80-33774
WORTMAN, D. E. N80-33692
N80-33724
WU, J. J. N80-34193
WU, S. C. N80-33432
WUEST, W. N80-33407

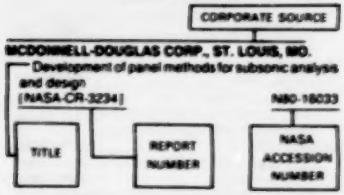
Y

YAKOVLEVA, V. I. N80-34066
YAMANE, N. I. N80-33428
YAMAZOE, N. N80-34262
YANG, P. P. N80-33792
YANG, T. N80-34190
YATOMI, C. N80-33802
N80-33803
N80-33804
N80-33805
YAVIN, Y. N80-34162
YAVORSKY, P. G. N80-34035
YEATER, M. L. N80-33442
YEGOROV, I. A. N80-34067
YEN, C. L. N80-33808
YOUNG, C. E. N80-33657
N80-33686
YOUNG, C. G. N80-33915
N80-33916
YOUNG, M. E. N80-34299
N80-34300
YUAN, S. W. K. N80-33717
YULE, A. J. N80-33714

Z

ZACHARIAS, G. N80-33398
ZAGO, L. N80-33897
ZALIKINA, Z. G. N80-34079
ZAMURS, J. N80-34017
ZANGER, H. N80-33642
ZEEUWEN, J. P. N80-33591
ZELENKA, J. N80-33651
ZHIZHINA, N. A. N80-34064
ZIB, P. N80-33959
ZIMMERMAN, W. F. N80-34093
ZIMMERMANN, K. N80-34118
ZIMMERMANN, K. J. N80-33897
ZORACKI, M. J. N80-34152
ZOZIME, A. N80-33528
ZUFFEREY, C. N80-33625
ZWANENBURG, R. N80-33879

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ACUREX CORP., MOUNTAIN VIEW, CALIF.
Air Pollution control device configurations
[PB80-193253] N80-33972
Assessment of H2S control technologies for geothermal power plants
[PB80-193709] N80-33973
Environmental assessment data systems: Terminology reference manual
[PB80-197916] N80-34288

ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT, NEUILLY-SUR-SEINE (FRANCE).
Special Course on Unsteady Aerodynamics
[AGARD-R-679] N80-33363
Helicopter flight test instrumentation
[AGARD-AG-160-VOL-10] N80-33406
Pressure and flow measurement
[AGARD-AG-160-VOL-11] N80-33407
Manual of documentation practices applicable to defense-aerospace scientific and technical information. Volume 2: Data recording and storage, mechanization systems and operations, announcement service and publications
[AGARD-AG-235-VOL-2] N80-34290

AEG-TELEFUNKEN, HEILBRONN (WEST GERMANY).
Aspects of large area and thin silicon solar cell technologies N80-33884
Diodes for space solar arrays N80-33887
Comparison of silicon solar cell characteristics at operating temperature after electron irradiation N80-33890

AEG-TELEFUNKEN, WEDEL (WEST GERMANY).
Manufacturing of space telescope solar array blankets N80-33875
Potential use of terrestrial photovoltaics for future space solar arrays N80-33882
Technology of elevated voltage solar arrays N80-33903

AERONAUTICAL RESEARCH LABS., MELBOURNE (AUSTRALIA).
Sea King Mk. 50 helicopter sonar dynamics study. A simplified control systems mathematical model
[AR-001-607] N80-33395
Fatigue testing of vampire wings
[ARL/STRUC-REPT-378] N80-33399
Techniques for examining drop size spectra in water sprays and clouds
[ARL/MECH-ENG-NOTE-375] N80-33721
A one-pass method for counting range mean pair cycle for fatigue analysis
[ARL-STRUC-NOTE-454] N80-33781
The stress-wave radiation from growing cracks
[ARL/MAT-REPT-112] N80-33796
A crack opening displacement approach to crack patching
[ARL/STRUC-NOTE-455] N80-33797
A design study in crack patching
[ARL/STRUC-REPT-376] N80-33798
Report on visit to Europe in May 1979, covering the 16th Meetings of the International Committee on Aeronautical Fatigue and Associated Visits
[AD-A074392] N80-34339

AEROSPACE CORP., EL SEGUNDO, CALIF.
Laser excited nonresonant fluorescence spectroscopy
[ATR-80(7783)-1] N80-33523

AEROSPACE ENGINEERING OFFICE, ZURICH (SWITZERLAND).
On the design verification of large flexible solar arrays: First experiences gained N80-33897

AGBABIAN ASSOCIATES, EL SEGUNDO, CALIF.
A first-order methodology for calculating probability of mission success
[AD-A088910] N80-34206

AIR FORCE ACADEMY, COLO.
Effects of criteria on flight simulation study 1: Heading deviation tolerance
[AD-A088908] N80-33423

AIR FORCE AERO PROPULSION LAB., WRIGHT-PATTERSON AFB, OHIO.
Regression modeling of turbine engine performance
[AD-A088898] N80-33411
Status of nickel-hydrogen cell technology N80-33474

AIR FORCE FLIGHT DYNAMICS LAB., WRIGHT-PATTERSON AFB, OHIO.
A compilation of computer software programs available in the Flight Dynamics Laboratory, 1979
[AD-A088954] N80-34156

AIR FORCE GEOPHYSICS LAB., HANSCOM AFB, MASS.
Instrumentation development for LASSII equatorial measurements
[AD-A088880] N80-34002
Almost-necessary conditions for a solar active region to produce a subsequent polar cap absorption event
[AD-A088882] N80-34003
In-flight characteristics of the topside ionospheric monitor (SSIE) on the DMSP satellite flight 2 and flight 4
[AD-A088879] N80-34005
Automation of visual weather observations
[AD-A088881] N80-34037

AIR FORCE HOSPITAL, DAVIS-MONTHAN AFB, ARIZ.
Loss of consciousness in high performance fighters (what to do about it) N80-33341

AIR FORCE HUMAN RESOURCES LAB., WILLIAMS AFB, ARIZ.
Advanced simulator for pilot training: Design of automated performance measurement system
[AD-A088855] N80-33421

AIR FORCE INST. OF TECH., WRIGHT-PATTERSON AFB, OHIO.
Criteria for applying commercial aircraft warranties in USAF aircraft purchases
[AD-A088774] N80-33343
Validation of the operating and support cost model for avionics automatic test equipment (OSCATE)
[AD-A088725] N80-33419
Comprehensive planning for passive solar architectural retrofit
[AD-A088680] N80-33907
Responsiveness and configuration control for embedded computer software
[AD-A088723] N80-34155

AIR FORCE WRIGHT AERONAUTICAL LABS., WRIGHT-PATTERSON AFB, OHIO.
Flying qualities design criteria
[AD-A088629] N80-33402
Air Force space power technology program N80-33488
Pilot plant forging of hydrogenated Ti-6Al-4V
[AD-A089107] N80-33558
Experimental investigation of the crack growth gage
[AD-A089137] N80-33801

ALLIED-GENERAL NUCLEAR SERVICES, BARNWELL, S.C.
Automated calibrations and dynamic corrections for differential pressure transmitters
[AGNS-35900-CONF-65] N80-33730

AMERICAN AIR FILTER CO., INC., LOUISVILLE, KY.
Environmental air quality control from the inside looking out N80-33980

AMERICAN AIRLINES FLIGHT ACADEMY, FORT WORTH, TEX.
Synthesized voice approach callouts for air transport operations
[NASA-CR-3300] N80-34098

AMERICAN ELECTRONIC LABS., INC., FARMINGDALE, N. J.
Installation of C-6533(XE-2)/ARC ICS in UH-1H helicopter
[AD-A088708] N80-33850

AMERICAN ELECTRONIC LABS., INC., LANSDALE, PA.
Spatial pulse compression
[AD-A084750] N80-33883

APPLIED MEDICAL TECHNOLOGY, CLEVELAND HEIGHTS, OHIO.
Tissue response to peritoneal implants
[NASA-CR-159817] N80-33478

APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., LAUREL, MD.
Low-cost flywheel demonstration program
[CONS-5085-T2] N80-33909
Energy programs at the John Hopkins University Applied Physics Laboratory
[PB80-195316] N80-33919

APPLIED SOLAR ENERGY CORP., CITY OF INDUSTRY, CALIF.
Impact of terrestrial solar cell development on space applications N80-33892

ARIZONA STATE UNIV., TEMPE.
Digital phase modulated fiber optical communication system N80-33631
Laminar film flow phenomena-theory and application to the two-phase closed thermosyphon N80-33703
Applications of computer-generated holograms in optical testing N80-33727

ARIZONA UNIV., TUCSON.
Generalized ray tracing, generalized bending and use of caustic surfaces as merit functions in optical design N80-34247
Heavy ions in Jupiter's environment
[NASA-CR-163603] N80-34321

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, DOVER, N. J.
Vapor cloud explosion studies in the United States N80-33595

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, WATERVLIET, N. Y.
Elastic-plastic analysis using a triangular ring element in NASTRAN N80-33780
Variational methods of convolution integral and of large spring constants: A numerical comparison [AD-A088902] N80-34193
ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND, MOFFETT FIELD, CALIF.
Calculation of three-dimensional unsteady transonic flows past helicopter blades [NASA-TP-1721] N80-33396
ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND, ST. LOUIS, MO.
Comparison of calculated and measured helicopter rotor teloval flapping angles [NASA-TM-81213] N80-33349
Experimental performance and analysis of 15.04-centimeter-tip-diameter, radial-inflow turbine with work factor of 1.126 and thick blading [NASA-TP-1730] N80-33410
ARMY ELECTRONICS RESEARCH AND DEVELOPMENT COMMAND, WHITE SANDS MISSILE RANGE, N. MEX.
Evaluation of specialized photoacoustic absorption chambers for Near Millimeter Wave (NMMW) propagation measurements [AD-A088942] N80-33654
ARMY ENGINEER TOPOGRAPHIC LABS., FORT BELVOIR, VA.
Radiative transfer in one dimensional, discretely stratified media [AD-A088885] N80-33653
ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Wave information study for United States coastlines. Report 1: Surface pressure field reconstruction for wave hindcasting purposes [AD-A089150] N80-34029
ARMY MATERIALS RESEARCH AGENCY, WATERTOWN, MASS.
The effects of laser radiation on pyrolytic silicon nitride coatings on slip-cast fused silica substrates [AD-A089130] N80-33738
ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT CENTER, FORT BELVOIR, VA.
Verification test of the change-of-pace station wagon [AD-A089059] N80-34297
Verification test of the bathronic mini van [AD-A089058] N80-34298
ARMY TEST AND EVALUATION COMMAND, ABERDEEN PROVING GROUND, MD.
Birefringent coating technique, photoelastic stress analysis [AD-A088657] N80-33799
ARO, INC., ARNOLD AIR FORCE STATION, TENN.
Measurement of turbine engine transient airflow in ground test facilities [AD-A088706] N80-33414
ASSOCIATED OCTEL CO. LTD., BLETCHLEY (ENGLAND).
Energy: Careful conservation or regulated waste N80-33951
ATMOSPHERIC ENVIRONMENT SERVICE, OTTAWA (ONTARIO).
Modification of the boundary layer by orography N80-33816
ATSUKO COMPUTING INTERNATIONAL, HUNTSVILLE, ALA.
Sun Series program for the REEDA System [NASA-CR-161579] N80-34327
AUSTRALIAN NUMERICAL METEOROLOGY RESEARCH CENTER, MELBOURNE.
Orographically controlled cross-equatorial flow N80-33821

B

BALLISTIC RESEARCH LABS., ABERDEEN PROVING GROUND, MD.
A NASTRAN investigation of simulated projectile damage effects on a UH-1B tail boom model N80-33791
BASEL UNIV. (SWITZERLAND).
Topics in analysis [AD-A080463] N80-34189
On reversible transformations of space elements [AD-A080447] N80-34202
BATTELLE INST., FRANKFURT AM MAIN (WEST GERMANY).
Explosion hazards of transport gases: Research within the reactor safety program of the Federal Republic of Germany N80-33586
BATTELLE PACIFIC NORTHWEST LABS., RICHLAND, WASH.
Oxygen/steam gasification of wood [PNL-3353] N80-33605
BELL HELICOPTER CO., FORT WORTH, TEX.
Investigation of vibration reduction through structural optimization [AD-A088917] N80-33403
Validation of the rotorcraft flight simulation program (C81) using operational loads survey flight test data [AD-A089008] N80-33422
BINRLE APPLIED RESEARCH, INC., JERICHO, N. Y.
Rotary balance data for a typical single-engine general aviation design for an angle of attack range of 8 deg to 90 deg. 1: Low wing model C [NASA-CR-3200] N80-33355
BIONETICS CORP., HAMPTON, VA.
Experimental and analytical studies for the NASA carbon fiber risk assessment [NASA-CR-159214] N80-33490
BIRMINGHAM UNIV. (ENGLAND).
Ion-ion neutralization [AD-A080209] N80-34001
BOEING AEROSPACE CO., SEATTLE, WASH.
Hybridized polymer matrix composites [NASA-CR-165146] N80-33489
BOEING CO., SEATTLE, WASH.
LARC-13 adhesive development [NASA-CR-159317] N80-33497
BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
Aircraft noise prediction program validation [NASA-CR-159333] N80-34219
BOEING VERTOL CO., PHILADELPHIA, PA.
VASCOMP 2. The V/STOL aircraft sizing and performance computer program. Volume 6: User's manual, revision 3 [NASA-CR-163639] N80-33401
BOLT, BERANEK, AND NEWMAN, INC., CAMBRIDGE, MASS.
Pilot/vehicle model analysis of visual and motion cue requirements in flight simulation [NASA-CR-3312] N80-33398
Satnet development and operation. Pluribus satellite IMP development. Remote site maintenance. Internet development. Mobile Access Terminal Network, TCP for the HP 3000, TCP - TAC [AD-A089025] N80-33456
Wavefront deconvolution studies [AD-A088548] N80-34278
BOLT, BERANEK, AND NEWMAN, INC., CANOGA PARK, CALIF.
Evaluation of Aero Commander sidewall vibration and interior acoustic data: Static operations [NASA-CR-159290] N80-33392
BOSTON UNIV., MASS.
Correlation of high latitude coronal holes with solar wind streams high above or below the ecliptic [AD-A087525] N80-34331
BRITISH AEROSPACE AIRCRAFT GROUP, BRISTOL (ENGLAND).
Linearised methods in supersonic flow N80-33380
BRITISH AEROSPACE DYNAMICS GROUP, BRISTOL (ENGLAND).
Telescopic masts for deployment of flexible solar arrays N80-33681
A general purpose computer program to assist in the system design of a solar array N80-33899
BRITISH BROADCASTING CORP., KINGSWOOD (ENGLAND).
A set of time varying television test patterns [BBC-RD-1980/9] N80-33638
BRITISH LIBRARY LENDING DIV., BOSTON SPA (ENGLAND).
Formation of organosilicon compounds. 58: Synthesis of a carbosilane with propellane structure [RAE-LIB-TRANS-2029(5207)] N80-33483
The determination of uni and tri valent gold in acid gold baths [BLL-RTS-12157] N80-33504
Regenerations of critical process solutions relative to recoveries of valuable substances [BLL-RTS-12141] N80-33505
Selective electroplating processes [BLL-RTS-11980] N80-33508
Hard-gold coatings deposited using pulsating current and their suitability for use in plug connections [BLL-RTS-12203] N80-33524
The use of current-less (chemical) nickel-plating in vacuum-and-precision- engineering [BLL-RTS-12025] N80-33525
Electron microscopical investigation on the age hardening of spring alloys based on Co-Ni-Cr-Fe [BLL-RTS-12152] N80-33526
Electroplating: Metal deposits by electrolysis, throwing power [BLL-RTS-11870] N80-33527
In situ doping of thin Ca (x)Hg (1-x)Te films obtained by cathode sputtering in mercury vapour. Application to the production of infrared detectors [BLL-RTS-11980] N80-33528
Bright dipping solution for iron-nickel-cobalt alloys [BLL-RTS-12198] N80-33529
The use of gluconates for electrolytic and current-less metal depositing [BLL-RTS-11997] N80-33530
Correlation between segregation and cold cracking [BLL-TRANS-4253-(9091.9F)] N80-33531
Chemical nickel-plating with sodium borohydride. Process technology and properties of coats [BLL-RTS-12156] N80-33532
The reflowing of tin-lead deposits [BLL-RTS-12262] N80-33533
The deposition of palladium coatings with low hydrogen content and stress in sulphuric acid electrolyte [BLL-RTS- (2767] N80-33534
The diffusion of copper into gold coatings at elevated temperatures [BLL-RTS-12292] N80-33535
Resistance to corrosion of chromated zinc coatings [BLL-RTS-12304] N80-33536
Noble metal electroplated coatings on printed circuit connectors [BLL-RTS-12265] N80-33537
Investigations into the distribution of the layer thickness produced by barrel electroplating in the case of cyanic silver plating [BLL-RTS-12204] N80-33538
Effects of flank protection media in the etching of copper [BLL-RTS-12359] N80-33539
Chromating [BLL-RTS-12344] N80-33540
The interaction between pipe-coatings and cathodic corrosion-protection [BLL-TRANS-T4943/BG/ERS/79] N80-33541
Cathodic corrosion-protection in areas subject to explosion hazards [BLL-T4934/BG/ERS/79(9022.048)] N80-33542
Metal surface damage due to cavitation erosion [BLL-RTS-12269] N80-33543
Control of solidification structures and properties of industrial Al-Si alloys [BLL-RTS-11916] N80-33544
The pressurized fluidized bed gasification of coal char [BLL-RTS-12347] N80-33575
The fluidized bed gasification of coal char [BLL-RTS-12346] N80-33576
The solution cycle in an absorption system with pressure equalising gas (theoretical and experimental investigations) [BLL-RTS-12307] N80-33608
Methods of digital speech signal transmission [BLL-RDL-TRANS-3798-(7737.470)] N80-33622
The TRANSMIC system. 1: General principles and presentation [BLL-RDL-TRANS-3766-(7737.470)] N80-33623
The TRANSMIC system. 3: Operations, availability and quality of service [BLL-RDL-TRANS-3765-(7737.470)] N80-33624
Frequency re-use by polarization on diversity on satellite links [BLL-TRANS-3663] N80-33625
Alternatives for the development of future television systems [BLL-RTS-12332] N80-33626
Pulse codes for the transmission of binary data [BLL-TRANS-3784] N80-33637

Relationship between short and long term rainfall rates and its implication for the design of radio links
[BLL-RDL-TRANS-3665-(7737.470)] N80-33643
Integrated screen printed hybrid circuits
[BLL-PO-TRANS-3749-(7737.470)] N80-33669
World progress in electronic switching. Part 2: Analysis of current trends
[BLL-TRANS-3756-(7737.470)] N80-33670
The mechanical pretreatment of printed circuit boards
[BLL-RTS-12263] N80-33671
State and trends in development of the manufacture of printed circuits
[BLL-RTS-12266] N80-33672
Influence of the environmental conditions on a quartz resonator
[RAE-LIB-TRANS-1897(5207)] N80-33673
The theory of two dimensional separated flows
[RAE-LIB-TRANS-2002] N80-33697
Magnetic-abrasive machining
[BLL-RTS-12400] N80-33742
Reasons for the occurrence of smooth work surfaces in metal cutting
[BLL-RTS-12078] N80-33743
The forced oscillation of the circular plates
[BLL-RTS-12070] N80-33756
Analysis and synthesis of operational loads
[RAE-LIB-TRANS-2108(5207)] N80-33757
Medium-scale study of a waving cold front
[BLL-TRANS-1453-(9022.549)] N80-34013
Circulation seasons in the Northern Hemisphere and the changes in their duration in the twentieth century
[BLL-TRANS-1455-(9022.549)] N80-34014
A method of correcting daily and monthly values of atmospheric precipitation and results of tests on it
[BLL-TRANS-1451-(9022.54)] N80-34028
Polyfungin, a new antifungal antibiotic. 4: The use of thin layer chromatography for determining the qualitative composition of the polyfungin complex
[BLL-RTS-12361] N80-34054
Theoretical and applied aspects of the anabiosis of microorganisms
[BLL-RTS-12350] N80-34055
Application of a computer programme for the determination of radioimmunological measured values
[BLL-RTS-12046] N80-34084
Identification of a nonlinear system by means of the modified GMDH
[BLL-TRANS-1446] N80-34135
Non-quadratic nomography, chapter 2
[BLL-RTS-12290] N80-34166
Some problems of practical nomography
[BLL-RTS-11700] N80-34167
A method of measuring the visibility of military objects
[RAE-LIB-TRANS-1981(5207)] N80-34242
Determination of surface active materials by square-wave polarography (polarography with rectangular wave)
[BLL-RTS-12170] N80-34243
Fixation of Zn(ii) ions on metal oxide surfaces
[BLL-RTS-12200] N80-34262

BROWN UNIV., PROVIDENCE, R. I.
Combined macroscopic and microscopic approach to the fracture of metals
[DOE/ER-10556/1] N80-33585
Diffusion approximations for the analysis of digital phase locked loops
[AD-A088703] N80-33689
Conservation laws with dissipation
[AD-A088762] N80-34276

C

CAIRO UNIV. (EGYPT).
Explosion hazards in the Suez Canal: An overview
N80-33584

CALIFORNIA ENERGY COMMISSION, SACRAMENTO.
Methanol/ethanol/gasoline blend fuels demonstration with stratified charge engine vehicles
[PB80-192123] N80-33606
Uranium resources: A review of estimation methodologies
[PB80-193725] N80-33920
The potential of energy farming in the southeastern California desert
[PB80-195019] N80-33921

CALIFORNIA INST. OF TECH., PASADENA.
Theoretical aspects of the mechanism of simple chemical reactions
[AD-A088804] N80-33481
Experimental investigations of the transport properties of flow suspensions. 1: Measurement of velocity distributions of suspension flows in a rectangular channel. 2: Experimental study of the effective thermal conductivity in shear flow of a suspension. 3: The use of fluorescence correlation spectroscopy to measure molecular diffusion and velocity distributions N80-33711
The equilibrium field near the tip of a crack for finite plane strain of incompressible elastic materials
[AD-A088838] N80-33800
Assessment of alternative strategies for sludge disposal into deep ocean basins off southern California
[PB80-192990] N80-33971
Fundamentals studies in geodynamics
[NASA-CR-163620] N80-33990
A numerical boundary integral equation method for transient motions N80-34108
Ion-beam-induced modifications of thin film structures and formation of metastable phases N80-34265
Comparative petrology of the Apollo 11 mare basalt, part 1. The oxygen isotope geochemistry of the Abitibi greenstone belt, part 2 N80-34313
Theoretical studies of solar oscillations
[NASA-CR-163611] N80-34326
Relativistic effects in extragalactic radio sources N80-34335

CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Evaluation of the effects of detonation in a spherical bomb N80-33594

CALIFORNIA UNIV., DAVIS.
Surface energy budget of the Tropical Pacific Ocean
[AD-A089148] N80-34030

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Nova: A high energy laser system
[UCRL-83204] N80-33740
Introduction to magnetic confinement fusion diagnostics
[UCID-18704] N80-34240

CALIFORNIA UNIV., LOS ANGELES.
Effects of ultra-high pressures on methanol, ethanol, calcium oxide, rutile, cassiterite, and germanium dioxide N80-33515
Superfluidity in 3He-4He mixture thin films N80-33609
Droplet evaporation in high temperature environments N80-33696
Vapors-liquid phase separator
[NASA-CR-163621] N80-33717
Electrochemically deposited cadmium telluride films and their application to solar cells N80-33853
Two dimensional smoothing of a vector Laplacian random field with application to geodesy N80-33982
A numerical study of the efficiency with which aerosol particles collide with simple planar ice crystals N80-33985
Dynamic transport of inert tracers by growing baroclinic and stationary planetary waves in the lower stratosphere of the Northern Hemisphere in winter N80-33986
Development of neurophysiological and behavioral metrics of human performance
[AD-A087840] N80-34100
Performance of computers with multiaccess memory N80-34107
Building block modeling methodology for composition of microprocessor-based digital systems N80-34109
A formal program model for discrete event simulation and its use in the verification and validation of system models and implementations N80-34139
Energy transfer in ionic and molecular systems N80-34222
Homogeneous vapor phase nucleation of large polar molecules under Limiting experimental conditions: High temperatures, low pressures, and long growth times N80-34224
High-energy proton-proton elastic scattering N80-34236
Effect of ICRF heating on single particle confinement in Tokamaks
[AD-A088578] N80-34261
Carbonate formation on Mars N80-34314

CALIFORNIA UNIV., SAN DIEGO.
Superconductivity, magnetism and structural study of some new ternary transition metal borides N80-33675
Stimulated emission processes from free electrons N80-33732
Development and application of a brain stem audiometer N80-34086
An application of digital image techniques to the high-velocity material in NGC 1275 N80-34304
Cosmic-ray produced radionuclides in extraterrestrial material N80-34332

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA.
Viscous flow near a sphere under surface gravity waves N80-33701
Low frequency sea level variability along the west coast of North America N80-34046

CALSPAN ADVANCED TECHNOLOGY CENTER, BUFFALO, N.Y.
Transonic shock wave - boundary layer interactions
[AD-A088831] N80-33289

CAMBRIDGE ELECTRON ACCELERATOR, MASS.
Research in general physics, plasma dynamics, and communication sciences and engineering
[RLE-PR-122] N80-34338

CAMBRIDGE UNIV. (ENGLAND).
Unsteady aerodynamics in turbomachinery N80-33369

CAPE TOWN UNIV. (SOUTH AFRICA).
Fluidized-bed combustion for pollution control N80-33938

CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
Dispersed flow heat transfer in circular tubes N80-33706
On the dynamic energy release rate in elastic crack propagation
[AD-A089119] N80-33802
On Irwins and Achenbachs expressions for the energy release rate
[AD-A089118] N80-33803
The effect of surface energy on temperature rise around a fast running crack
[AD-A088756] N80-33804
Note on the energy release rate for a crack starting from the apex of a wedge
[AD-A089116] N80-33805
Forward linear programming N80-34143
On the convergence of a block successive overrelaxation method for a class of linear complementarity problems
[AD-A088760] N80-34154

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.
Surface oxide softening in tungsten N80-33549
The behavior of inmold dioxidation in steel castings N80-33550
The yielding behavior of unidirectional metal-matrix composites N80-33551
Vinyl acetate emulsion polymerization kinetics and mechanism N80-33567
Studies of uniform spherical colloids prepared by emulsion polymerization N80-33568
Characterization and theory of electrolyte-insulator-semiconductor field-effect transistor N80-33678
Human lung ventilation, mechanics and morphology N80-34085
Asymptotic analysis of linear filtering problems N80-34177
The epitaxial polymerization of (SN)x N80-34264
Verification of abstract types whose representations share storage N80-34283
A deep near-infrared objective-prism survey for carbon stars toward the galactic center and anticenter N80-34305

CENTER FOR THE ENVIRONMENT AND MAN, INC., HARTFORD, CONN.
The perturbation of some atmospheric mechanisms by emissions from aircraft
[AD-A089100] N80-33965

CENTRE D'ETUDES ET DE RECHERCHES, TOULOUSE (FRANCE).
Solar cell modeling for computer-aided generator design and irradiation degradation computations N80-33896

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, POITIERS (FRANCE).
Unconfined hydrocarbon air mixture explosion studies performed in France by CEA-EDF-GDF and the University N80-33985
CHEMICAL ENGINEERING RESEARCH GROUP, PRETORIA (SOUTH AFRICA).
Preparation and stability of emulsions of methanol in automobile diesel oil [CSIR-CENG-284] N80-33579
The prevention of dust emissions in South Africa by electrostatic precipitation N80-33937
Developments in industrial emission measurements: Progress towards an automated isokinetic sampler N80-33945
CHICAGO AERIAL INDUSTRIES, INC., BARRINGTON, ILL.
Advanced electro-optical tracker/ranger [AD-A089143] N80-34254
CHICAGO UNIV., ILL.
Oxygen and nitrogen nuclear magnetic resonance studies of amides and aromatic aldehydes and ketones N80-33514
CHRISTIAN MICHELSENS INSTITUTT FOR VIDENSKAP OG ANDSFRIHET, BERGEN (NORWAY).
Large scale gas explosion experiments in Norway N80-33582
CINCINNATI UNIV., OHIO.
Study of laminar and turbulent flow in ducts of polar cross-section N80-33889
CITY COUNCIL OF CAPE TOWN (SOUTH AFRICA).
Municipal refuse as a fuel for power generation N80-33950
CITY OF PORT ELIZABETH (SOUTH AFRICA).
Utilization of municipal refuse as an energy source N80-33952
CITY UNIV. OF NEW YORK, N. Y.
The effect of turbulence on wave propagation in the atmosphere: Generation attenuation and scattering N80-33629
Elementary patterns for large conformal arrays N80-33632
An air-vapor-droplet local interaction model for spray units N80-33708
Effects of heavy particles at low energies N80-34231
Some aspects of the nonlinear interaction of light and matter N80-34248
Some aspects of the nonlinear interaction of light and matter N80-34257
Experimental investigation of modulational effects in a magnetized plasma N80-34259
CLARKSON COLL. OF TECHNOLOGY, POTSDAM, N.Y.
The activated carbon thin film adsorber N80-33518
Crystallization under nonuniform conditions N80-34266
COLORADO STATE UNIV., FORT COLLINS.
Baffle aperture design study of hollow cathode equipped ion thrusters [NASA-CR-165164] N80-33476
Ionic interactions in the liquid state by multinuclear magnetic resonance N80-33516
Finite element analysis for elasto visco-plastic materials N80-33770
Ground water monitoring strategies to support community management of on-site home sewage disposal systems N80-33826
Local response of ITO/polysilicon solar cells N80-33855
Tropical cyclone genesis: Numerical modeling inferences N80-34016
Atmospheric variability and air-sea interaction N80-34023
Optical and magnetic resonance studies of energy transfer in inorganic molecular solids [AD-A088567] N80-34271
COLORADO UNIV. AT BOULDER.
Determination and maintenance of Earth orbits with arcs of minimum altitude variation N80-33447
Precise predictions of grand unified gauge theories N80-33627
A multi-step method for avalanche zone recognition and analysis N80-33824
Seismic stress relaxation phenomena in an inhomogeneously prestressed medium N80-33983
An analysis of Pascal programs and several basic block optimizations N80-34140
Boundary approximation and time step control in iterative improvement for the numerical solution of partial differential equations N80-34170
Experimental electron-impact excitation and ionization of positive ions N80-34226
Two examples of the decay instability in an inhomogeneous plasma N80-34258
A mathematical approach to empirical astrophysics with applications N80-34308
Spectroscopy of the Mars airglow from Mariner 9 ultraviolet spectrometer data N80-34317
Mesogranulation and supergranulation in the Sun N80-34325
COLUMBIA UNIV., NEW YORK.
The use of sources and sinks in solving two-dimensional heat conduction problems with change of phase in arbitrary domains N80-33704
Experimental investigation of hydrodynamic self-acting gas bearings at high Knudsen numbers N80-33744
On the asymptotic analysis of Griffiths' period mapping N80-34174
COMMISSION OF THE EUROPEAN COMMUNITIES, LUXEMBOURG.
Data recording and storage N80-34291
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION (U. S. SENATE).
Operational remote sensing legislation, part 1 [GPO-45-048] N80-34294
Operational remote sensing legislation, part 2 [GPO-52-581] N80-34295
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS (U. S. SENATE).
The status of environmental economics: An update [GPO-48-402] N80-33963
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE (U. S. HOUSE).
Energy policy: Supply and demand alternatives [GPO-58-541] N80-33870
Incentives for energy conservation [GPO-55-634] N80-33871
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION (U. S. HOUSE).
Aviation safety: DC-10 crash of May 25, 1979 [GPO-54-572] N80-33393
COMMITTEE ON SCIENCE AND TECHNOLOGY (U. S. HOUSE).
Oversight: Alternate liquid fuels technology [GPO-50-313] N80-33580
Oversight: Cost estimation techniques for emerging synthetic fuels technology, volume 9 [GPO-51-721] N80-33581
Oversight: Wind energy program [GPO-51-382] N80-33872
Low-level ionizing radiation [GPO-50-084] N80-33964
COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, ASPENDALE (AUSTRALIA).
Laboratory studies of topographic effects in rotating and/or stratified fluids N80-33819
COMMUNICATIONS RESEARCH CENTRE, OTTAWA (ONTARIO).
Syncompex: A voice processing system for low cost HF radio telephony [CRC-1316-E] N80-33648
ANIK-B Doc communications system and ground terminals [CRC-TN-704-E] N80-33649
CONTROL DATA CORP., MINNEAPOLIS, MINN.
MAPS image compression [AD-A089763] N80-34153
CORNELL UNIV., ITHACA, N. Y.
The self-training interpretive and retrieval system: Improved substructure perception N80-33509
Computer prediction of molecular weights from unknown mass spectra N80-33517
Digital image processing in ion microscope analysis: Methods of image quantification [AD-A088792] N80-33559
Two approaches towards a low power solid state laser N80-33734
Effect of surface ellipticity on dynamically loaded spherical and cylindrical joints and bearings N80-33766
Design for the prevention of progressive collapse using interactive computer graphics N80-33767
Three-dimensional finite element analysis of cyclic fatigue crack growth of multiple surface flaws N80-33768
Radar observations of the equatorial electrojet irregularities and theory of type 1 turbulence N80-33980
Specification and verification of communications in parallel systems N80-34108
The size of numbers in the analysis of certain algorithms N80-34142
The probability of survival of redundant systems under a static load N80-34199
Digital image processing of conventional transmission electron micrographs N80-34229
Collective acceleration of ions in vacuum N80-34230
Two problems pertaining to the dynamics of the origin of the Moon, and its subsequent orbital evolution N80-34310
COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, PRETORIA (SOUTH AFRICA).
International Conference on Air Pollution, volume 1 [ISBN 0-7988-1665-1] N80-33929
International conference on Air Pollution, volume 2 [ISBN-0-7988-1665-1] N80-33936
Progress with a new velocity electric precipitator the Electro-Dynamic Venturo (EDV) N80-33941
International Conference on Air Pollution, volume 3 [ISBN-0-7988-1665-1] N80-33943
The determination of tin oxide in airborne dust N80-33944
An improved method for the determination of arsenic and its use for air pollution studies N80-33946
Measurements of carbon monoxide in the southern hemisphere N80-33947
Remote sounding techniques applied to mesoclimate measurements N80-33948
Aspects of the interaction among some of the parameters of importance to pollution potential considerations N80-33949
International Conference on Air pollution, volume 4 N80-33954
Environment: The energy connection N80-33955
Possibilities and limitations of different types of dispersion models with respect to air quality management N80-33959
The Transfer of Pollutants in Two Southern Hemispheric Oceanic Systems [REPT-39] N80-33961
Programming alternatives for NC machines tools [TSD-T-79106] N80-34163

D

DEFENCE RESEARCH INFORMATION CENTRE, ORPINGTON (ENGLAND).
Announcement services and publications N80-34293
DEFENSE MAPPING AGENCY, WASHINGTON, D.C.
Geodetic positioning using a global positioning system of satellites [NASA-CR-163609] N80-33991
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research [NASA-TM-82215] N80-33999
DEFENSE MAPPING AGENCY HYDROGRAPHIC AND TOPOGRAPHIC CENTER, WASHINGTON, D.C.
Application of thematic mapping techniques in terrain analysis [AD-A089061] N80-33847
DEHEURTLEY (GRACIELA L.), BUENOS AIRES (ARGENTINA).
Methodology for the research of air pollution in urban areas N80-33934
DELAWARE UNIV., NEWARK.
Mass loss from warm giants: Magnetic effects [NASA-CR-163602] N80-34322
DEPARTMENT OF ENERGY, WASHINGTON, D. C.
Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 1: Coal-fired nocogeneration process boiler, section A [NASA-CR-159770-PT-1] N80-33860
DEPARTMENT OF ENERGY (US), LONDON (ENGLAND).
Working group on fuel consumption targets [NP-24333] N80-33910

DEPARTMENT OF HEALTH, JOHANNESBURG (SOUTH AFRICA).
The assessment of smoke emission from diesel-engined vehicles N80-33935

DEPARTMENT OF NATIONAL DEFENCE, OTTAWA (ONTARIO).
The behavior of the military battery type BB248/U used to start the engine of the A.P.C.
[AD-A080615] N80-33905

Evaluation of cranking characteristics of commercially available batteries between room temperature and -40 C
[AD-A080614] N80-33906

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN (WEST GERMANY).
Method for inviscid subsonic flows about aircraft configurations N80-33368

DEUTSCHE VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BAD GODESBERG (WEST GERMANY).
Data handling in the medical experiment of the Spacelab Preparatory Program ASSESS 2
[DFVLR-MITT-78-02] N80-34114

The use of computer-controlled manipulators in underwater technology
[DFVLR-MITT-78-02] N80-34117

DEUTSCHE VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, COLOGNE (WEST GERMANY).
Coupling of IBM and Siemens systems on RJE-basis as implemented in Regional Computer Center for the Mannheim and Heidelberg Universities
[DFVLR-MITT-78-02] N80-34120

Experimental work place for the EBOSIPES research project
[DFVLR-MITT-78-02] N80-34122

Software for EBOSIPES: Present state and trends
[DFVLR-MITT-78-02] N80-34123

DEUTSCHE VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, OBERPFAFFENHOFEN (WEST GERMANY).
Digital computers as components of complex systems
[DFVLR-MITT-78-02] N80-34113

Computer-supported access systems in space flight
[DFVLR-MITT-78-02] N80-34115

Description of a system for the interactive processing of the image data of a geostationary weather satellite
[DFVLR-MITT-78-02] N80-34116

Operational data handling: An essential need for the accurate determination of satellite orbits
[DFVLR-MITT-78-02] N80-34118

Problems of autonomous airborne satellite control systems
[DFVLR-MITT-78-02] N80-34119

Use of the operating system OS-MVS in the technical and scientific field
[DFVLR-MITT-78-02] N80-34121

The use of PROINF in the research project EBOSIPES
[DFVLR-MITT-78-02] N80-34124

Employment of a digital computer in the tests to ascertain the useful life of the thruster RIT 10
[DFVLR-MITT-78-02] N80-34125

DOUGLAS AIRCRAFT CO., INC., LONG BEACH, CALIF.
Carbon/graphite fiber risk analysis and assessment study: An assessment of the risk to Douglas commercial transport aircraft
[NASA-CR-159212] N80-33488

DREXEL INST. OF TECH., PHILADELPHIA, PA.
Long wave trapping by a linear ridge topography
[AD-A088840] N80-34051

DUKE UNIV., DURHAM, N. C.
Measurements of boundary layer flow over a forested mountain slope N80-34018

A simulation facility for performance evaluation of shared-resource computer architectures N80-34110

Inclusive study of 200 GeV/c pi-neon interactions N80-34232

An improved six-port technique for measuring complex reflection coefficient N80-34249

DYNAMICS RESEARCH CORP., WILMINGTON, MASS.
Digital Avionics Information System (DAIS): Life cycle cost impact modeling system Reliability, Maintainability, and Cost Model (RMCM): User's guide
[AD-A089045] N80-33405

E

EAGLE-PICHER INDUSTRIES, INC., JOPLIN, MO.
Nickel-zinc batteries for RPV applications
[AD-A088594] N80-33908

ELCAM, INC., SANTA BARBARA, CALIF.
Installation package for a sunspot cascade solar water heating system
[NASA-CR-161562] N80-33866

Design package for solar domestic hot water system
[NASA-CR-161558] N80-33867

ELECTRICITY COMMISSION OF NEW SOUTH WALES, SYDNEY (AUSTRALIA).
Collecting fly ash from low sulphur coals: An Overview of Australian experience N80-33932

ELECTROMAGNETIC SYSTEMS LABS., INC., SUNNYVALE, CALIF.
QPSK, DPSK, and FSK demodulator performance under nuclear stressed conditions
[AD-A088264] N80-33685

ELECTRONICS RESEARCH LAB., ADELAIDE (AUSTRALIA).
The action of water vapour on ion irradiated alkali silicate glasses
[AD-A089023] N80-33572

ENVIRONMENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK, N.C.
Engineering reference manual for coding NEDS (National Emissions Data System) and EIS/P and R (Emission Inventory Subsystem/Permits and Registration) forms
[PB80-194665] N80-34299

ENVIRONMENTAL RESEARCH INST. OF MICHIGAN, ANN ARBOR.
Meeting of the IRIS specialty group on infrared detectors, volume 1
[ERIM-139600-3-X(I)] N80-34241

ESSO PETROLEUM CO. LTD., ABINGDON (ENGLAND).
A philosophy for clean air N80-33930

EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS, READING (ENGLAND).
Cyclogenesis in the lee of orography and its numerical modeling with special reference to the Alps N80-33818

EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Telematics and satellites. Part 1: Information systems
[ESA-BR-04-PT-1] N80-33668

Photovoltaic generators in space
[ESA-SP-147] N80-33873

Contributions to the symposium: Computer Science in Space Flight
[ESA-TT-587] N80-34112

EUROPEAN SPACE TECHNOLOGY CENTER, NOORDWIJK (NETHERLANDS).
The solar cell blanket design for space telescope's roll-out solar array N80-33874

Study of the internal mechanics of space photovoltaic generators N80-33878

Design and technology of solar arrays for shuttle launched missions N80-33883

A comparison of solar array radiation damage models N80-33891

Efficient thermal cycling of solar panels in solar simulation facilities with a multi-panel test rig N80-33898

Satellite power systems: Status and planned activities N80-33904

F

FEDERAL AVIATION ADMINISTRATION, ATLANTIC CITY, N.J.
Precision I-band DME tests
[AD-A089053] N80-33388

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D. C.
Detection and assessment of secondary sonic booms in New England
[AD-A088180] N80-33382

Washington National Airport flight extension test. Noise monitoring data report
[AD-A089111] N80-33998

FEDERAL AVIATION AGENCY, ATLANTIC CITY, N.J.
Automated flight plan filing by simulated voice recognition
[AD-A089138] N80-34105

FEDERAL AVIATION AGENCY, WASHINGTON, D.C.
Proceedings of the NATO Advanced Study Institute on Atmospheric Ozone and its variation and human influences
[AD-A088889] N80-34096

FEDERAL COMPILER TESTING CENTER, WASHINGTON, D.C.
TANDEM 16, COBOL -T9201D00
[PB80-190283] N80-34134

FIRST NATIONAL BANK OF CLARKSDALE, MISS.
Solar heating system at Quitman County Bank, Marks, Mississippi
[NASA-CR-161549] N80-33858

FLORIDA STATE UNIV., TALLAHASSEE.
Lung deposition of aerosols from industrial environments N80-33933

FLORIDA UNIV., GAINESVILLE.
Localized impact problems of composite laminates N80-33759

FREIBURG UNIV. (WEST GERMANY).
The influence of topographic structures on night-time surface temperatures: Evaluation of a satellite thermal image of the upper Rhine plain and the surrounding highlands
[EB0-10228] N80-33629

G

GARD, INC., NILES, ILL.
Energy conservation and management study of aircraft hangars at selected Air Force Bases
[AD-A089075] N80-33420

GENERAL DYNAMICS/CONVAIR, SAN DIEGO, CALIF.
Application of advanced technologies to small, short-haul air transports
[NASA-CR-152364] N80-33396

Time-temperature-stress capabilities of composite materials for advanced supersonic technology application, phase 1
[NASA-CR-159267] N80-33496

GENERAL DYNAMICS CORP., GROTON, CONN.
Study for conceptual design of VEO, VTOL exhaust nozzle
[NASA-CR-152388] N80-33397

GENERAL ELECTRIC CO., CINCINNATI, OHIO.
Energy efficient engine
[NASA-CR-159685] N80-33408

Determination of pollutant emissions characteristics of General Electric CF6-6 and CF6-50 model engines
[AD-A086927] N80-33412

GENERAL ELECTRIC CO., LYNN, MASS.
High bypass turbofan component development. Amendment 1: Small fan redesign
[AD-A089067] N80-33413

GENERAL ELECTRIC CO., SCHENECTADY, N. Y.
Origin of magnetic properties in amorphous metals
[AD-A089145] N80-32560

Cogeneration Technology Alternatives Study (CTAS). Volume 4: Energy conversion systems
[NASA-CR-159768] N80-33859

Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 1: Coal-fired nocogeneration process boiler, section A
[NASA-CR-159770-PT-1] N80-33860

Cogeneration Technology Alternatives Study (CTAS). Volume 6: Computer data. Part 2: Residual-fired nocogeneration process boiler
[NASA-CR-159770-PT-2] N80-33861

GEOLOGICAL SURVEY, WASHINGTON, D. C.
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research
[NASA-TM-82215] N80-33399

GEORGE WASHINGTON UNIV., WASHINGTON, D.C.
Spatially resolved studies of flame and plasma as sources for atomic spectroscopy N80-33511
An analytical and experimental investigation of biaxial loading effects on cracks emanating from a circular hole N80-33762

GEORGETOWN UNIV., WASHINGTON, D.C.
Non-specular ultrasonic bounded beam transmission through solid plates N80-34214
Phonon-induced nonequilibrium states in superconducting films: A kinetic equation study N80-34263

GEORGIA INST. OF TECH., ATLANTA.
Experimental determination of the admittances of solid propellants by the impedance tube technique N80-33464
Analytical compensation for near-field probe positioning errors in calculated far-field antenna patterns N80-33628
Frequency skipping in negative-resistance oscillators with applications to crystal-controlled monolithic phase-locked loops N80-33677
Enhancement of thermal energy transport through granular media N80-33702
Cavitation damage mechanisms: Experimental study cavitation in a spool valve [AD-A083653] N80-33750
General nonlinear computer analysis of framed structures N80-33769

GEORGIA UNIV., ATHENS.
Difficult gas-chromatographic separations: Isotopic fractionations and extracts of carbonaceous materials N80-33510
A unit stratifications sample design using rotational sampling N80-34176
Interval estimation, ranking and selection procedures N80-34197

GESELLSCHAFT FUER HOCHTEMPERATURREAKTOR-TECHNIK M.B.H., BENSBERG (WEST GERMANY).
The gas cloud explosion program on the PNP-project N80-33587

GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.
Circulation Control Wing (CCW) Flight Tests N80-33339

H

HAMILTON STANDARD, WINDSOR LOCKS, CONN.
Extravehicular Crewman Work System (ECWS) study program. Volume 1: Executive summary [NASA-CR-163597] N80-34101
Extravehicular Crewman Work System (ECWS) study program. Volume 2: Construction [NASA-CR-163598] N80-34102
Extravehicular Crewman Work System (ECWS) study program. Volume 3: Satellite service [NASA-CR-163599] N80-34103
Extravehicular Crewman Work System (ECWS) study program. Volume 4: Program evolution [NASA-CR-163600] N80-34104

HARRIS CORP., MELBOURNE, FLA.
Multiple Microprocessor System (MMS) design study, volume 2 [AD-A089086] N80-34180

HARRY DIAMOND LABS., ADELPHI, MD.
Research study on near millimeter wave orotrons [AD-A089097] N80-33692
The extended Rayleigh theory of the oscillation of liquid droplets [AD-A088894] N80-33724

HARVARD COLL. OBSERVATORY, CAMBRIDGE, MASS.
Computer assisted performance tests of the Lyman Alpha Coronagraph [NASA-CR-163622] N80-33462

HAWAII UNIV., HONOLULU.
Low frequency temperature fluctuations in the upper 400 meters of the central North Pacific N80-34042

HEALTH AND SAFETY EXECUTIVE, SHEFFIELD (ENGLAND).
Research on vapor cloud explosions in the United Kingdom N80-33588

HITACHI LTD., TOKYO (JAPAN).
Improvements in sparse matrix operations of NASTRAN N80-33784

HONEYWELL CORPORATE MATERIAL SCIENCES CENTER, BLOOMINGTON, MINN.
Studies of indium-doped silicon [AD-A088736] N80-34269

HOWARD UNIV., WASHINGTON, D. C.
The dynamics and control of large flexible space structures. Volume 3, part B: The modelling, dynamics, and stability of large Earth pointing orbiting structures [NASA-CR-163612] N80-33449

HUGHES AIRCRAFT CO., EL SEGUNDO, CALIF.
Qualification test results of the production high efficiency K6-3/4 and K7 silicon solar cells N80-33886

HUGHES RESEARCH LABS., MALIBU, CALIF.
Silicon germanium alloys for infrared detectors [AD-A088732] N80-33502
Development of space-qualified GaAs solar cells N80-33888
Ion implantation of wide bandgap semiconductors [AD-A089026] N80-34268

HUMAN ENGINEERING LABS., ABERDEEN PROVING GROUND, MD.
Users manual for the transparent touch sensitive cathode ray tube display overlay [AD-A089809] N80-33691

HUMAN RESOURCES RESEARCH ORGANIZATION, ALEXANDRIA, VA.
Civil helicopter wire strike assessment study. Volume 1: Findings and recommendations [NASA-CR-152389] N80-33381

I

IBM FEDERAL SYSTEMS CENTER, GAITHERSBURG, MD.
Interactive digital image processing investigation, phase 2 [AD-A087518] N80-33848

IIT RESEARCH INST., CHICAGO, ILL.
TNT equivalency testing of chemical mixtures in continuous TNT manufacturing [AD-A089803] N80-33800

ILLINOIS UNIV. AT CHICAGO CIRCLE, CHICAGO.
Single particle gas-solid reactions and their application to modeling of fluidized bed coal combustors and ash agglomerating gasifiers N80-33578
Pulsating flow and heat transfer in curved tubes N80-33712
An accurate and computationally fast formulation for radiative fields and heat transfer in general, plane-parallel, non-gray media with anisotropic scattering N80-33713
The twisting and stretching of a nontinear annulus including the effect of wrinkling N80-33764

ILLINOIS UNIV. AT URBANA-CHAMPAIGN, URBANA.
Corrosion of fiber composites with aluminum alloy matrices [AD-A089584] N80-33583

ILLINOIS UNIV., URBANA.
Research in aeronomy [NASA-CR-163610] N80-33896

IMPALA PLATINUM LTD. (ENGLAND).
A method for routine isokinetic dust sampling N80-33942

INDIANA UNIV. AT BLOOMINGTON.
Maximum likelihood estimation for stationary point processes [AD-A089117] N80-34205

INSTITUT DE RECHERCHE DE L'HYDRO-ONTARIO.
An enhancement of NASTRAN for the seismic analysis of structures N80-33787

INSTITUTE FOR LAND AND WATER MANAGEMENT RESEARCH, WAGENINGEN (NETHERLANDS).
Defining relationships between surface characteristics and actual evaporation rate [E80-10335] N80-33834

INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).
Data collection platforms: A technique for space telemetry applied to surveying ambient parameters [INPE-1743-RPE/139] N80-33759
Synchronization tolerance to receiving errors in coded EM and PCM signals transmitted by meteorological satellites [INPE-1760-RPE/146] N80-33644
Telecommando transmission system for stratospheric balloons [INPE-1830-RPE/194] N80-33645
Geometry of an antenna positioner for geostationary satellites [INPE-1795-NTE/161] N80-33646
Platform antennas for data collection [INPE-1820-RPE/186] N80-33647
Filter project with a planar circuit in the waveguide [INPE-1817-RPE/185] N80-33680
Control of the recombination time in photoconductive detectors [INPE-1814-RPE/182] N80-33681
Impact oscillator waveguides [INPE-1816-RPE/184] N80-33682
Development of a technique for determining natural radioactivity using slow-speed aircraft at low altitudes [INPE-1821-RPE/195] N80-33838
The use of radiation temperature to detect water-stress in sugarcane crop [INPE-1787-TDL/028] N80-33839
A method for edge detection in images of natural resources [INPE-1768-RPE/154] N80-33840
Thermal balance of soils [INPE-1859-RPE/210] N80-33841
Contributions of LANDSAT imagery to the geological mapping of the Rio do Grande Sul Shield [INPE-1838-RPE/199] N80-33842
Digital filtering of LANDSAT images as a visual aid technique in geological photointerpretation [INPE-1823-RPE/189] N80-33843
Coastal currents: Study of a model applied to the coast of Rio Grande do Sul latitude 29 deg south to 35 deg south [INPE-1841-RPE/201] N80-33844
Comment on Airglow observations of the OI 7774 A multiplet at Arecibo during a magnetic storm by Roger G. Burnside, John W. Meriwether and James C. G. Walker [INPE-1843-RPE/203] N80-33994
Absorption equilibrium of solar radiation between the two hemispheres of Earth [INPE-1851-RPE/208] N80-33995
Statistical relation between the solar cycle and drought in northeast Brazil [INPE-1839-RPE/200] N80-34024
Development of an automatic system for plotting synoptic charts [INPE-1786-RPE/158] N80-34025
Algorithm for extracting data from meteorological satellites for use in estimating precipitation [INPE-1789-RPE/155] N80-34026
Workshop for Forecasting Droughts in Northeast Brazil [INPE-1739-RPE/138] N80-34027
Artificial intelligence: Promises or results? [INPE-1834-RPE/196] N80-34184
Ordinary differential equations [INPE-1753-RPE/144] N80-34184
Determining the form factors of plane and cylindrical surfaces by numerical methods [INPE-1815-RPE/183] N80-34185
Optimal linear estimation applied to the generation of a direct method for investigating parameter optimization [INPE-1855-RPE/209] N80-34187
Consistency, redundancy and extension in fuzzy systems for regressive decision [INPE-1850-RPE/207] N80-34210
Astronomical telescope for photons-gamma rays of low energy (approximately 4 MeV using the difference method like a Venetian blind [INPE-1807-RPE/175] N80-34306
On the comet model of Biermann et al [INPE-1805-RPE/173] N80-34323
Measurements of secondary cosmic radiation aboard a jet aircraft at altitudes of 12 and 12.5 km over Boa Vista and Campinas [INPE-1808-RPE/176] N80-34337

INTERNATIONAL BUSINESS MACHINES CORP., ROCHESTER, MINN.
Finite circular plate on elastic foundation controlly loaded by rigid spherical indenter N80-33792

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS, ROME (ITALY).
Orographic effects in planetary flows [GARP-PUBL-23] N80-33811

IOWA UNIV., IOWA CITY.
IMP 8. Volume 1: EM field experiment [NASA-CR-160023] N80-33450
IMP-8. Volume 2: Scientific section [NASA-CR-160024] N80-33451
Turbulent heat transfer to liquid metals in a circular pipe N80-33795
New engineering approaches to noninvasive His-Purkinje system recordings N80-34087
Topics in model completeness of direct powers and direct products of theories N80-34169
Large electrostatic potential variations in laboratory plasmas N80-34260
The Jovian magnetosphere N80-34316
IRT CORP., SAN DIEGO, CALIF.
Low energy atomic collisions [AD-A088748] N80-34234

J

JBF SCIENTIFIC CORP., WILMINGTON, MASS.
Evaluation of processes for producing gasoline from wood [DOE/PE-70048/T2] N80-33602
JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
The telecommunications and data acquisition report [NASA-CR-163808] N80-33427
The table mountain 8-mm-wavelength interferometer N80-33428
Pattern measurements of a low-sidelobe horn antenna N80-33429
The SETI instrument development plan N80-33430
A bimodal search strategy for SETI N80-33431
ORION S-band data acquisition for S-Y calibration N80-33432
Network functions and facilities N80-33433
DSN Ground Communications Facility N80-33434
The DSN programming system N80-33435
Planning a DSN support section technical library N80-33436
International solar polar mission N80-33437
A study of the processes in the RF hydrogen gas dissociator N80-33438
Experimental optical fiber communications link N80-33439
Open-loop radio science with a suppressed-carrier signal N80-33440
Noise adding radiometer performance analysis N80-33441
Networks consolidation program N80-33442
DSN system performance test software N80-33443
TRISCAN: A method of precision antenna positioning N80-33444
Planetary radar N80-33445
Deep space network energy program N80-33446
Analytic theory of orbit contraction and ballistic entry into planetary atmospheres [NASA-CR-163627] N80-33448
Drag-free estimation feasibility study [NASA-CR-163635] N80-33454
Process modifications for improved carbon fiber composites: Alleviation of the electrical hazards problem [NASA-CR-163631] N80-33494
Coding for spread spectrum packet radios [NASA-CR-163628] N80-33639
Satellite communication performance evaluation: Computational techniques based on moments [NASA-CR-163629] N80-33640
A parametric analysis of performance characteristics of satellite-borne multiple-beam antennas [NASA-CR-163632] N80-33641
Control means for a solid state crossbar switch [NASA-CASE-NPO-15066-1] N80-33679
Climatological relationships of severe duststorms in the Great Plains to synoptic weather patterns: A potential for predictability [NASA-CR-163626] N80-34022
Health requirements for advanced coal extraction systems [NASA-CR-163265] N80-34093
A fiber optic transmission line stabilization apparatus and method [NASA-CASE-NPO-15036-1] N80-34250
Overview of escalator applications in rail transit [NASA-CR-163633] N80-34296
Voyager encounters Jupiter [NASA-CR-163607] N80-34318
Saturn: Origin and composition of its inner moons and rings [NASA-CR-163630] N80-34320
The minimum flux corona: theory or concept [NASA-CR-163636] N80-34329
JOHNS HOPKINS UNIV., BALTIMORE, MD.
A watershed information system N80-33825
JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
USSR Report: Space Biology and Aerospace Medicine, volume 14, no. 4, 1980 [JPRS-76415] N80-34058
Hygiene and toxicology of human waste gases N80-34059
Cardiorespiratory system reactions of cosmonauts to exercise following long-term missions aboard the Salyut 6 orbital station N80-34060
Reactions to LBNP test of the crew of the Salyut 6 orbital station N80-34061
Preflight distinctions of Staphylococcus aureus carriers among cosmonauts N80-34062
Static endurance of rats after flight aboard the Cosmos 936 biosatellite N80-34063
Comparative study of effects of weightlessness and artificial gravity on density, ash, calcium and phosphorous content of calcified tissues N80-34064
Morphological study of rat kidneys after flight aboard the Cosmos-936 biosatellite N80-34065
Morphological changes in rat lungs after flight aboard the Cosmos-936 biosatellite N80-34066
Template activity of chromatin DNA and the adenylate cyclase system of rat tissues following flight aboard the Cosmos-936 biosatellite N80-34067
Effects of transmeridional flights and highland conditions on different forms of memory N80-34068
The role of functional asymmetry of the central nervous system in pilot performance N80-34069
Distinctions of pilot motor activity in different piloting modes during landing approaches N80-34070
Effect of periodic exposure to head-pelvis accelerations on a short-arm centrifuge on responses of the human cardiovascular system N80-34071
Effect of antiorthostatic hypokinesia and space flight factors on change in leg volume N80-34072
Some of the physiological effects of 30 day bed rest with the body in different positions N80-34073
Circadian rythm of human body temperature in antiorthostatic position N80-34074
Histostructural correlations in the hypothalamus-hypophysis-kidneys system under hypokinetic conditions N80-34075
Effect of conditioning animals for hypoxia on their resistance to poison inhalation N80-34076
Experimental studies of setting standard for optimun salt composition of portable water N80-34077
Effects of different hygienic factors on exhalation of acetone by man N80-34078
Lesions to and recovery of mouse seminiferous epithelium after exposure to radiation at different dose rates N80-34079
The role of temperature in experiments on biological objects under extreme conditions N80-34080
Micronuclei in rat bone marrow after flight aboard the Cosmos 936 biosatellite N80-34081
Analysis of changes in evoked bioelectrical activity of the brain during exposure to high-intensity stationary magnetic field N80-34082
Distribution of benzene in tissues of hypokinetic animals N80-34083
JRB ASSOCIATES, MCLEAN, VA.
Controlling hazardous wastes research summary [PB80-194202] N80-33970

K

KANSAS UNIV., LAWRENCE.
Acoustic plane waves incident on an oblique clamped panel in a rectangular duct [KU-FRL-417-14] N80-34215
KATHOLIEKE UNIVERSITEIT TE LEUVEN (BELGIUM).
The influence on the front metal coverage factor on the open-circuit voltage of silicon solar cells N80-33892
KENT STATE UNIV., OHIO.
Torsion theory and modules of finite length N80-34173
KENTUCKY UNIV., LEXINGTON.
Synthesis methods applicable to SEM pole pair admittances [AD-A088923] N80-33880
Structures and algorithms in stochastic realization theory and the smoothing problem [AD-A088485] N80-34192
KMS FUSION, INC., ANN ARBOR, MICH.
Interaction of short wavelength laser radiation with spherical shell targets [KMSF-U-953] N80-33741

L

LIBRARY OF CONGRESS, WASHINGTON, D. C.
The status of environmental economics: An update [GPO-48-402] N80-33963
LINCOLN LAB., MASS. INST. OF TECH., LEXINGTON.
Effect of downlink phased array patterns on system availability contour predictions [AD-A088664] N80-33681
Optimal properties of the circular array for use as an adaptive antenna [AD-A088592] N80-33685
Oscillatory beam quality effects in modular high energy laser systems [AD-A088655] N80-33736
LITTLE (ARTHUR D.), INC., CAMBRIDGE, MASS.
Potential of spark ignition engine, electronic engine and transmission control [PB80-192701] N80-33751
LOCKHEED-CALIFORNIA CO., BURBANK.
Carbon/graphite fiber risk analysis and assessment study: Assessment of risk to the Lockheed Model L-1011 commercial transport aircraft [NASA-CR-159201] N80-33487
LOCKHEED ELECTRONICS CO., INC., LAS VEGAS, NEV.
Multispectral techniques for remote monitoring of sediment in water: A feasibility investigation [PB80-198500] N80-33849
LOCKHEED ENGINEERING AND MANAGEMENT SERVICES CO., INC., HOUSTON, TEX.
Utilization of spectral-spatial information in the classification of imagery data [E80-10321] N80-33832
LOCKHEED-GEORGIA CO., MARIETTA.
Evaluation of laminar flow control system concepts for subsonic commercial transport aircraft [NASA-CR-159253] N80-33394
LOCKHEED MISSILES AND SPACE CO., PALO ALTO, CALIF.
Numerical method for predicting flow characteristics and performance of nonaxisymmetric nozzles. Part 2: Applications [NASA-CR-3264] N80-33354
Across three (active control of space structures), phase 1 [AD-A089142] N80-33481
Inelastic response of an infinite cylindrical shell to a transient acoustic wave [AD-A088597] N80-33808
LOS ALAMOS SCIENTIFIC LAB., N. MEX.
Similitude modeling of natural convection heat transfer through an aperture in passive solar heated buildings [LA-8385-T] N80-33726
Evaluation of in-line nondestructive assay systems [LA-8411-PR] N80-33755
Preliminary study of the potential environmental concerns associated with surface waters and geothermal development of the Valles Caldera [LA-8398-MS] N80-33969
LOUISIANA STATE UNIV. AND A&M COLL., BATON ROUGE.
Ion flotation studies and separtion procedures for the platinum group metals N80-33545

A quantitative evaluation of LANDSAT for monitoring suspended sediments in a fluvial channel
N80-33823

M

MARTIN MARIETTA CORP., DENVER, COLO.
Evaluation and prediction of long term space environmental effects on non-metallic materials
[NASA-CR-161585] N80-33479
MARYLAND UNIV., COLLEGE PARK.
Reading handwritten words using hierarchical relaxation N80-34161
Correction, correlation, and theoretical consideration of lunar X-ray fluorescence intensity ratios
N80-34315
Cosmic ray propagation and instabilities
N80-34334
MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Dynamic fractures in orthotropic fiber composites
N80-33486
Preparation of homogeneous living polyvinyl gels with application to solvent purification
[AD-A089993] N80-33574
Flow control and routing algorithms for data networks
[AD-A088767] N80-34159
MAX-PLANCK-INSTITUT FUER STROEMUNGSFORSCHUNG, GOETTINGEN (WEST GERMANY).
Discussion on explosion hazards
[MPIS-23/1979] N80-33582
MCDONNELL-DOUGLAS ASTRONAUTICS CO., HUNTINGTON BEACH, CALIF.
Cleaning agents and techniques for concentrating solar collectors
[SAND-79-7052] N80-33911
MCDONNELL-DOUGLAS CORP., LONG BEACH, CALIF.
Cargo Logistics Airlift Systems Study (CLASS). Volume 5: Summary
[NASA-CR-158951] N80-33382
MCGILL UNIV., MONTREAL (QUEBEC).
Research on vapor cloud explosions and related phenomena in Canada N80-33583
MEDICAL RESEARCH COUNCIL, LONDON (ENGLAND).
Clean air and health Britain in the 1970's
N80-33831
MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., OTTOBRUNN (WEST GERMANY).
Ultrathin cell module technology N80-33876
METCUT RESEARCH ASSOCIATES, INC., CINCINNATI, OHIO.
Effect of multiple shot peening/cadmium plating on high strength steel
[AD-A088667] N80-33561
MIAMI UNIV., CORAL GABLES, FLA.
Mathematical modeling of two-phase flow oscillations N80-33707
A two-dimensional diabatic isopycnal model of a coastal upwelling front N80-34043
Generalized addition sets N80-34171
Localized atomic orbitals for atoms in molecules
N80-34225
Non-projective transformations in optics
N80-34246
MIAMI UNIV., FLA.
Investigations of medium wavelength magnetic anomalies in the eastern Pacific using Magsat data
[E80-10334] N80-33833
Numerical study of baroclinic instability
[NASA-CR-161580] N80-33992
MICHIGAN STATE UNIV., EAST LANSING.
Radar waveform synthesis for target identification
[AD-A089573] N80-33660
MICHIGAN UNIV., ANN ARBOR.
A study of hybrid computing techniques for transonic flow fields
[AD-A089662] N80-33360
The 1979 towed source experiment signal generator
[AD-A088757] N80-33659
Applications of non-self-adjoint operator theory to the Singularity Expansion Method (SEM) and the Eigenmode Expansion Method (EEM) in acoustic and electromagnetic problems
[AD-A088747] N80-34191
MIDWEST RESEARCH INST., KANSAS CITY, MO.
Source emission measurements of volatile organic chemicals
[PB80-196518] N80-33974
Fine particle emissions information system
[PB80-195753] N80-33981
MISSISSIPPI STATE UNIV., MISSISSIPPI STATE.
Errors in finite-difference computations on curvilinear coordinate systems
[NASA-CR-163801] N80-34178
MISSOURI UNIV., COLUMBIA.
Gravity geophysical dilineation of buried channel aquifers in the dissected till plains of northern Missouri
[PB80-194343] N80-33851
MISSOURI UNIV. -KANSAS CITY.
Construction and testing of an ion photofragment momentum spectrometer
[AD-A088753] N80-34238
MONITOR LABS., INC., CALIF.
Ambient air quality monitoring systems: State of the art N80-33958
MONSANTO EUROPE S.A., LOUVAIN-LA-NEUVE (BELGIUM).
Current techniques for the elimination of airbourne mists and soluble solids N80-33940
MOUND LAB., MIAMISBURG, OHIO.
Role of surface chemistry in the ignition of pyrotechnic materials
[MLM-2708(OP)] N80-33603
Thermal and electrostatic initiation of TiH/sub x based pyrotechnics
[MLM-2710(OP)] N80-33604

N

NATAL UNIV., PIETERMARITZBURG (SOUTH AFRICA).
The use of solar energy for cooking N80-33953
NATIONAL AERONAUTIC ASSOCIATION, WASHINGTON, D. C.
NASA plan for international crustal dynamics studies
[NASA-TM-82214] N80-34000
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C.
Aeronautical engineering: A continuing bibliography, supplement 125
[NASA-SP-7037(125)] N80-33336
On the swelling of rolled up vortex surfaces and the breakdown of the vortex core for slender wings
[NASA-TM-75862] N80-33346
FLTSATCOM-D
[NASA-NEWS-RELEASE-80-158] N80-33424
The United States space observation policy
[NASA-TM-76373] N80-33425
Mission operation report: Voyager program Voyager 1 encounter at Saturn November 12, 1980
[NASA-TM-82217] N80-33426
Meteor and remote sensing satellites (a collection of articles)
[NASA-TM-76389] N80-33453
NASA technology program overview N80-33467
Spacecraft system overview of space power at geostationary Earth Orbit N80-33469
Thermal management for high power space platform systems N80-33472
Private sector involvement in civil space remote sensing. Volume 1: Report
[NASA-TM-82206] N80-33845
Private sector involvement in civil space remote sensing. Volume 2: Appendices
[NASA-TM-82207] N80-33846
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research
[NASA-TM-82215] N80-33999
Aerospace medicine and biology. A continuing bibliography with indexes, supplement 210, September 1980
[NASA-SP-7011(210)] N80-34088
Publications of the exobiology program for 1979: A special bibliography
[NASA-TM-821..2] N80-34106
NASA patent abstracts bibliography. A continuing bibliography with indexes, supplement 17, section 2, July 1980
[NASA-SP-7039(17)-SECTION-2] N80-34284
A bibliography of planetary geology principal investigators and their associates, 1979 - 1980
[NASA-TM-82180] N80-34301
Voyager 1: Encounter with Saturn
[NASA-NEWS-RELEASE-80-159] N80-34324
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Experimental unsteady aerodynamics of conventional and supercritical airfoils
[NASA-TM-81221] N80-33345
Comparison of calculated and measured helicopter rotor lateral flapping angles
[NASA-TM-81213] N80-33349
Calculation of three-dimensional unsteady transonic flows past helicopter blades
[NASA-TP-1721] N80-33356
Numerical solution techniques for unsteady transonic aerodynamics problems N80-33379
Influence of quality control variables on failure of graphite/epoxy under extreme moisture conditions
[NASA-TM-81245] N80-33493
A rapid implicit-explicit solution to the two-dimensional time dependent incompressible Navier-Stokes equations
[NASA-CR-3330] N80-33718
Stability of nonuniform rotor blades in hover using a mixed formulation
[NASA-TM-81226] N80-33777
Human acclimation and acclimatization to heat: A compendium of research, 1968-1978
[NASA-TM-81181] N80-34056
Automation literature: A brief review and analysis
[NASA-TM-81245] N80-34097
Effects of magnification and visual accommodation on airpoint estimation in simulated landings with real and virtual image displays
[NASA-TP-1635] N80-34099
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. HUGH L. DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIF.
The oblique wing-research aircraft N80-33338
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
On the application of nonlinear load elements to thermal analyses using the NASTRAN thermal analyzer N80-33789
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 1: Optical auroral images and related direct measurements
[NASA-TM-81121] N80-33997
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
Shuttle OFT Level C navigation requirements
[NASA-TM-82221] N80-33457
Electrochemical Orbital Energy Storage (ECOES) technology program N80-33473
Users' guide for the tabular display report generator program (TABDIS)
[NASA-TM-82211] N80-34148
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
Launch mission summary: FLTSATCOM-D Atlas/Centaur-57
[NASA-TM-82213] N80-33452
Launch mission summary and terminal countdown, Delta 153 Satellite Business Systems satellite (SBS-A)
[NASA-TM-82212] N80-33455
Ninth NASTRAN Users' Colloquium
[NASA-CP-2151] N80-33782
Development and analysis of the learjet 54/55 fuselage NASTRAN model using substructure techniques N80-33794
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
NASA general aviation stall/spin flight testing
N80-33340
Conceptual study of an advanced supersonic technology transport (AST-107) for transpacific range using low-bypass-ratio turbofan engines
[NASA-TM-81872] N80-33342

Low-speed aerodynamic characteristics of a highly swept arrow wing configuration with several deflected leading edge concepts
[NASA-TM-80190] N80-33347

A flight investigation of performance and loads for a helicopter with 10-64C main rotor blade sections
[NASA-TM-81871] N80-33348

A simple method for converting frequency domain aerodynamics to the time domain
[NASA-TM-81844] N80-33358

Analysis of general aviation single-pilot IFR incident data obtained from the NASA aviation safety reporting system
[NASA-TM-80206] N80-33384

Loads calibrations of strain gage bridges on the DAST project Aeroelastic Research Wing (ARW-1)
[NASA-TM-81889] N80-33393

Development and test results of a flight management algorithm for fuel conservative descents in a time-based metered traffic environment
[NASA-TP-1717] N80-33404

Conceptual model of turbulent flameholding for scramjet combustors
[NASA-TP-1543] N80-33409

Longitudinal stability and control in wind shear with energy height rate feedback
[NASA-TM-81828] N80-33416

Plenum response to simulated disturbances of the model and fan inlet guide vanes in a transonic tunnel
[NASA-TM-81869] N80-33418

Orbiter thermal pressure drop characteristics for shuttle orbiter thermal protection system components: High density tile, low density tile, densified low density tile, and strain isolation pad
[NASA-TM-81891] N80-33460

High speed lookup table approach to radiometric calibration of multispectral image data
[NASA-TP-1741] N80-33463

Electronic equipment vulnerability to fire released carbon fibers
[NASA-TM-80219] N80-33491

Tackifier for addition polyimides
[NASA-TM-81883] N80-33570

Polyimides: Thermally stable aerospace polymers
[NASA-TM-81884] N80-33571

Comparative performance of HgCdTe photodiodes for heterodyne application
[NASA-TP-1745] N80-33683

On the performance of explicit and implicit algorithms for transient thermal analysis
[NASA-TM-81880] N80-33715

A compendium of computational fluid dynamics at the Langley Research Center
[NASA-TM-81817] N80-33716

Calculation of laminar heating rates on three-dimensional configurations using the axisymmetric analogue
[NASA-TP-1698] N80-33719

Multi-parameter yield zone for predicting spectrum crack growth
[NASA-TM-81850] N80-33778

Turbid water measurements of remote sensing penetration depth at visible and near-infrared wavelength
[NASA-TM-81843] N80-33927

In situ ozone data for evaluation of the laser absorption spectrometer ozone remote sensor: 1979 southeastern Virginia urban plume study summer field program
[NASA-TM-81831] N80-33928

Atmospheric solar absorption measurements in the 9 to 11 mu m region using a diode laser heterodyne spectrometer
[NASA-TP-1726] N80-33998

Assessment of the role of remote sensing in the study of inland and coastal waters
[NASA-TM-81881] N80-34048

Passenger comfort technology for system decision making
[NASA-TM-81875] N80-34096

Predicted airframe noise levels
[NASA-TM-81849] N80-34218

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.

WIND: Computer program for calculation of three dimensional potential compressible flow about wind turbine rotor blades
[NASA-TP-1729] N80-33357

Experimental performance and analysis of 15.04-centimeter-tip-diameter, radial-inflow turbine with work factor of 1.126 and thick blading
[NASA-TP-1730] N80-33410

Synchronous Energy Technology
[NASA-CP-2154] N80-33465

Synchronous energy technology program
N80-33466

Photovoltaic technology development for synchronous orbit N80-33470

Method of making bearing material
[NASA-CASE-LEW-11930-3] N80-33482

Long-time creep behavior of the niobium alloy C-103
[NASA-TP-1727] N80-33555

Improved bond coatings for use with thermal barrier coatings
[NASA-TM-81567] N80-33556

Effect of cage design on characteristics of high-speed-jet-lubricated 35-millimeter-bore ball bearing
[NASA-TP-1732] N80-33749

Toroidal cell and battery
[NASA-CASE-LEW-12918-1] N80-33857

MOD-2 wind turbine farm stability study
[NASA-CR-165156] N80-33862

Radiation damage in high voltage silicon solar cells N80-33869

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.

Large solar arrays N80-33471

Power management N80-33475

Characterization of three types of silicon solar cells for SEPS Deep Space Mission. Volume 3: Current-voltage characteristics of spectrolab sculptured BSR/P+ (K7), BSR/P+ (K8.5) and BSR (K4.5) cells as a function of temperature and intensity
[NASA-TM-78305] N80-33863

SUMC fault tolerant computer system
[NASA-CR-161581] N80-34111

Self-replicating systems: A systems engineering approach
[NASA-TM-78304] N80-34209

Collimated beam manifold and method for using the same
[NASA-CASE-MFS-25312-1] N80-34251

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.

Control means for a solid state crossbar switch
[NASA-CASE-NPO-15066-1] N80-33679

A fiber optic transmission line stabilization apparatus and method
[NASA-CASE-NPO-15036-1] N80-34250

NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER, ATLANTIC CITY, N. J.

Test and evaluation of Texas Instruments small community microwave landing system
[AD-A088852] N80-33387

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.

Application of solidification theory to rapid solification processing
[AD-A089006] N80-33480

Kinetic and photochemical data for atmospheric chemistry reactions of the nitrogen oxides
[PB80-198799] N80-34009

Photometry and colorimetry of retroreflection: State-of-measurement-accuracy report
[PB80-201783] N80-34256

Accuracy in powder diffraction: Proceedings of a symposium
[PB80-200488] N80-34272

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.

Influence of orography on the atmospheric general circulation N80-33812

Planetary waves: Theory and observation N80-33813

Mountain waves and momentum flux N80-33815

NATIONAL GEOPHYSICAL AND SOLAR-TERRESTRIAL DATA CENTER, BOULDER, COLO.

Solar terrestrial physics services and publications 1980
[PB80-199136] N80-34012

NATIONAL INST. FOR AERONAUTICS AND SYSTEMS TECHNOLOGY, PRETORIA (SOUTH AFRICA).

The problem of wind tunnel flow nonuniformity in free-model aircraft dynamic stability
[CSIR-NIAST-79-80] N80-33352

Introduction to the fundamentals of strain gauge practice
[NIAST-79/154] N80-33728

NATIONAL MECHANICAL ENGINEERING RESEARCH INST., PRETORIA (SOUTH AFRICA).

The aerodynamics of contra-rotating axial flow wind power turbines
[CSIR-ME-1639] N80-33868

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ANN ARBOR, MICH.

Spectral growth and nonlinear characteristics o...and waves in Lake Ontario
[PB80-193261] N80-33850

Great Lakes degree-day and temperature summaries and norms, 1897 - 1977
[PB80-195977] N80-34040

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.

Solar-terrestrial predictions proceedings. Volume 4: Prediction of terrestrial effects of solar activity
[PB80-200025] N80-34011

Wind shear detection with pulse Doppler radar
[AD-A088576] N80-34032

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FLA.

Determination of atmospheric water vapor from dewpoint measurement
[PB80-197189] N80-34039

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.

Improved algorithm for calculation of UTM and geodetic coordinates
[NOAA-S/T-80-261] N80-33836

Proceedings of the Workshop on Government Oil Spill Modeling
[NASA-CR-163640] N80-33979

The coordinated federal program for the application of space technology to crustal dynamics and earthquake research
[NASA-TM-82215] N80-33999

The Federal Plan for Meteorological Services and Supporting Research, fiscal year 1981
[PB80-199482] N80-34041

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).

A case study of environmental noise evaluation
[NPL-AR-96] N80-33825

NATIONAL PHYSICAL RESEARCH LAB., PRETORIA (SOUTH AFRICA).

Bonne's projection of Meteosat images
[CSIR-SR-FIS-201] N80-33837

NATIONAL RESEARCH INST. FOR MATHEMATICAL SCIENCES, PRETORIA (SOUTH AFRICA).

A comprehensive model for human motion simulations and its application to the take-off phase of the long jump
[CSIR-TWISK-131] N80-34147

Optimal controls that maximize the probability of being in a given set at a given time
[CSIR-TWISK-135] N80-34182

Rejection of a single outlier in a factorial design
[CSIR-TWISK-117] N80-34179

Boundary controllability of hyperbolic partial differtial equations
[CSIR-TWISK-126] N80-34180

Location of multiple outliers in factorial designs, using tetrads
[CSIR-TWISK-127] N80-34181

Power series expansion for a crossing-symmetric vertex function
[CSIR-TWISK-134] N80-34182

Testing for equality of variance of correlated normal variables
[CSIR-TWISK-136] N80-34183

A cusum for a scale parameter
[CSIR-TWISK-130] N80-34186

Strict chebyshev approximation of discrete data
[CSIR-TWISK-133] N80-34201

Tensor products and Banach ideals of p-compact operators
[CSIR-TWISK-132] N80-34211

The stability of planar dynamical systems linear-in-cones
[CSIR-TWISK-137] N80-34212

A descriptive approach to multiple-criteria decision making
[CSIR-TWISK-128] N80-34281
Database design: Choice of a methodology
[CSIR-TWISK-102] N80-34286
NATIONAL RESEARCH INST. FOR OCEANOLOGY, STELLENBOSCH (SOUTH AFRICA).
A three dimensional finite difference model of the transport of suspended sediment
[CSIR-RR-359] N80-33962
Tidal prediction program
[CSIR-SEA-8001] N80-34049
NATIONAL SCIENCE FOUNDATION, WASHINGTON, D. C.
The coordinated federal program for the application of space technology to crustal dynamics and earthquake research
[NASA-TM-82215] N80-33899
NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.
Tropospheric scatter communications. Citations from the NTIS data base
[PB80-812571] N80-33386
Inertial navigation and guidance. Citations from the NTIS data base
[PB80-812415] N80-33389
Omega navigation system. Citations from the NTIS data base
[PB80-812712] N80-33390
Hydrogen use as a fuel. Citations from the NTIS data base
[PB80-813090] N80-33907
Mathematical analysis of stress cracks. Citations from the NTIS data base
[PB80-813447] N80-33909
State-of-the-art reviews and bibliographies on energy. Citations from the NTIS data base
[PB80-812886] N80-33917
State-of-the-art reviews and bibliographies on energy. Citations from the NTIS data base
[PB80-812894] N80-33918
Lead batteries. Citations from the NTIS data base
[PB80-813363] N80-33923
Lead batteries. Citations from the Engineering Index data base
[PB80-813371] N80-33924
Ocean wave sensing. Citations from the NTIS data base
[PB80-812878] N80-34053
Microcomputers: Telecommunication applications. Citations from the NTIS data base
[PB80-812688] N80-34126
Microcomputers: Telecommunication applications. Citations from the Engineering Index data base
[PB80-812696] N80-34127
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812597] N80-34128
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812605] N80-34129
Microcomputers: Design and software development. Citations from the NTIS data base
[PB80-812613] N80-34130
Microcomputers: Design and software development. Citations from the NTIS data base
[PB80-812621] N80-34131
Microcomputers: General applications. Citations from the NTIS data base
[PB80-812639] N80-34132
Microcomputers: Basic design and development. Citations from the NTIS data base
[PB80-812654] N80-34133
The use of computers in solving mathematical problems. Citations from the NTIS data base
[PB80-813298] N80-34194
Technology Assessment. Citations from the NTIS data base
[PB80-813165] N80-34299
Technology Assessment. Citations from the NTIS data base
[PB80-813173] N80-34300
NATIONAL TELECOMMUNICATION INFORMATION ADMINISTRATION, ANNAPOLIS, MD.
Spectrum resource assessment in the 2.7 to 2.9 GHz band. Phase 2: LSR deployment in the Los Angeles and San Francisco areas
[PB80-194467] N80-33391
NATIONAL WEATHER SERVICE, SALT LAKE CITY, UTAH.
NMC model performance in the Northeast Pacific
[PB80-199033] N80-34038
The SWAB (Spectral Wave And Bar) program
[PB80-199041] N80-34052
NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.
Catalytic incineration of graphite fibers in a graphite-epoxy composite fire
[AD-A088897] N80-33503
NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
Space shuttle solid rocket booster retrieval system: Five NOSC papers on space shuttle support
[AD-A089080] N80-33458
Geomagnetic activity and the equatorial scintillation of satellite signals
[AD-A088848] N80-33652
Design of a fiber optic data link for the Ground Launched Cruise Missile
[AD-A088947] N80-34252
NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Experiments concerning categorical forecasts of open-ocean visibility using model output statistics
[AD-A088790] N80-34035
NAVAL RESEARCH LAB., ORLANDO, FLA.
Finite element modeling of the coupled thermal and momentum diffusion equations
[AD-A089068] N80-34277
NAVAL RESEARCH LAB., WASHINGTON, D. C.
Testing iodized activated carbon filters with nonradioactive methyl iodide
[AD-A088866] N80-33522
A study of RF nonlinearities in nickel
[AD-A088770] N80-33562
Application of picosecond and light scattering spectroscopies to the study of energetic materials
[AD-A088904] N80-33596
On the microwave interaction with matter and microwave breakdown of air
[AD-A088936] N80-33656
The danger of intermodulation generation by RF connector hardware containing ferromagnetic materials
[AD-A088788] N80-33657
Intrinsic sources of IM generation
[AD-A088771] N80-33658
Connector design techniques to avoid RFI
[AD-A088789] N80-33686
Computer-aided analysis for the design of broad classes of microwave couplers, filters, and transmission lines
[AD-A088772] N80-33687
Vector-potential flow in relativistic beam diodes
[AD-A089135] N80-33694
Doppler velocimeter for laser accelerated targets
[AD-A089134] N80-33739
Performance of the solar cell experiment on the NTS-2 satellite N80-33895
Batch processing with the radioiodine laser induced-fluorescence detector
[AD-A088773] N80-33968
Equatorial spread F in situ measurements of electron density temperature and density fluctuation power spectra
[AD-A089133] N80-34008
Icing characteristics of low altitude, supercooled layer clouds, revision
[AD-A088892] N80-34036
Steady state treatment of relativistic electron beam erosion
[AD-A089047] N80-34237
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
Afterbody drag. Volume 3: Literature survey
[AD-A088938] N80-33361
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, BETHESDA, MD.
Power losses in liquid metal current collectors
[AD-A089527] N80-33684
New capacities and modifications for NASTRAN level 17.5 at DTNSRDC N80-33783
Comparison of finite element analysis of a piping tee using NASTRAN and CORTES/SA N80-33795
Analysis of residual stresses resulting from cold rolling of notches and their effect on fatigue behavior
[AD-A089110] N80-33807
NAVAL SUBMARINE MEDICAL RESEARCH LAB., GROTON, CONN.
Aids for improving vision in white-out
[AD-A088726] N80-34094
NAVAL UNDERWATER SYSTEMS CENTER, NEW LONDON, CONN.
Solution sensitivity and accuracy study of NASTRAN for large dynamic problems involving structural damping N80-33785
Ring element dynamic stresses N80-33786
NAVAL WEAPONS SUPPORT CENTER, CRANE, IND.
Spectral distributions 5: Visible spectra of standard and improved green flare compositions
[AD-A089055] N80-33597
NEVADA UNIV., RENO.
A study of the microstructure of convective clouds: Observation and theory N80-34019
NEW ENGLAND RESEARCH APPLICATION CENTER, STORRS, CONN.
Battery electrolytes. Citations from the NTIS data base
[PB80-808629] N80-33915
Battery electrolytes. Citations from the Engineering Index data base
[PB80-808637] N80-33916
NEW SOUTH WALES UNIV., KENSINGTON (AUSTRALIA).
Equivalence techniques for vibration testing N80-33760
NEW YORK UNIV., N. Y.
Radiation-induced graft polymerization of styrene onto cellulose esters N80-33566
NKF ENGINEERING ASSOCIATES, INC., VIENNA, VA.
Solution of enforced boundary motion in direct transient and harmonic problems N80-33788
NOAH (J. WATSON) ASSOCIATES, INC., FALLS CHURCH, VA.
Implications of requiring new production of older aircraft types (less than 75,000 pounds) to meet amended noise standards
[AD-A088577] N80-33967
NORTH CAROLINA STATE UNIV. AT RALEIGH.
Sorption, transport and dilatometric studies in glassy polymers N80-33569
An investigation of certain fundamental invariance properties of field theories including gravitational theories with torsion N80-33987
NORTH CAROLINA UNIV. AT CHAPEL HILL.
Characterization of surface complexes on lithium N80-33546
Atomic effects in nuclear reactions N80-34229
Continuous irradiation methods for nuclear resonance line-narrowing N80-34233
NORTHEASTERN FOREST EXPERIMENT STATION, BROOMALL, PA.
Site index prediction tables for oak in northwestern West Virginia
[PB80-189830] N80-33852
NORTHEASTERN UNIV., BOSTON, MASS.
Trace analysis of antimony by differential pulse anodic stripping voltammetry N80-33507
Studies in atomic absorption spectroscopy utilizing electrothermal atomization N80-33513
An investigation of continuous phase frequency shift keying as a modulation on additive impulsive atmospheric noise channels N80-33833
NORTHROP CORP., HAWTHORNE, CALIF.
Flow visualization study of the F-14 fighter aircraft configuration
[NASA-CR-163098] N80-33350
NOTRE DAME UNIV., IND.
Hydrogen transport in nickel base superalloys N80-33552

O

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
La Recherche Aerospatiale, Bi-monthly Bulletin no. 1980-1
[ESA-TT-651] N80-33613
Vibrations of several obstacles within the two dimensional flow of incompressible fluid N80-33614
Ultrasound level-meter for measuring propellant levels in Ariane tanks in its first and second stages N80-33615

Reverse pseudo-unsteady aerodynamic calculation methods N80-33616
The ONERA vacuum ultraviolet spectrograph and its use for the study of surface layers in titanium and its alloys N80-33617
In situ experiments in the 1 MV electron microscope. Part 1: Feasibility and methodology N80-33618
A digital unit for measuring unsteady pressure coefficients N80-33619
An electrical method of measuring strain and damage N80-33620

OFFICE OF NAVAL RESEARCH, TOKYO (JAPAN).
Electrostatic precipitation research in Japan
[PB80-194127] N80-33975

OFFICE OF TECHNOLOGY ASSESSMENT, WASHINGTON, D. C.
Conservation and solar energy programs of the Department of Energy: A critique
[PB80-197759] N80-33922

OHIO STATE UNIV., CLEVELAND.
On the application of the GTD-MM technique and its limitations
[AD-A088806] N80-33655

OHIO STATE UNIV., COLUMBUS.
A comprehensive investigation into the supersonic viscous flow about a slender cone at high angle of attack: Experimental and theoretical results N80-33344
Conduction heat transfer analysis in composite materials
[AD-A088741] N80-33499
The passivity of nickel-effects of applied potential, solution pH and environmental temperature N80-33553
Fracture and flow of iron and its alloys: Theory and experiment N80-33554
Material characterization for studing flexible pavement behavior in fatigue and permanent deformation N80-33611
Analytical and numerical solutions for mass diffusion in a composite cylindrical body N80-33698
The characterization of the crack growth behaviour of alloy IN-100 at elevated temperature under sustained load N80-33765
Geodetic positioning using a global positioning system of satellites
[NASA-CR-163609] N80-33991
The recognition of straight line patterns by bus automations using parallel processing N80-34128
Automatic flowsheet drawing for the computer aided design of chemical processes using interactive computer graphics N80-34144
Statistical considerations in control models with applications
[AD-A088963] N80-34165
Estimation of the larger mean
[AD-A088661] N80-34204
Excitation of spin waves at magnetic domain walls N80-34213
Management guidance for research climate N80-34280
Spectra of late-type stars in the one to four micron region N80-34302
Radio spectral characteristics of extragalactic objects N80-34333

OLD DOMINION UNIV., NORFOLK, VA.
A sensitivity analysis of volcanic aerosol dispersion in the stratosphere
[NASA-CR-163606] N80-33926

OPTICAL COATING LAB., INC., SANTA ROSA, CALIF.
Frosted solar cell covers N80-33877
An evaluation of spectrally selective reflectors (cold mirror membranes) for use with concentrator solar arrays N80-33900

OREGON STATE UNIV., CORVALLIS.
A model of wind-forced viscous circulation near coastal boundaries N80-34044
Properties of the oceans reflected in the sea-bed distribution of quaternary planktonic Foraminifera: Including a study of the limits of empirical Paleo-Oceanographic models and the recognition and interpretation of faunal assemblages lacking modern counterparts N80-34047
Identification and analysis of simple models for the response time of complex computer systems N80-34157
Estimation of the population total when the sample is taken from a list containing an unknown amount of duplication N80-34198

OSLO UNIV. (NORWAY).
Orographic effects revealed by satellite pictures: Meso-scale flow phenomena N80-33820

P

PATTERN ANALYSIS AND RECOGNITION CORP., ROME, N. Y.
Image feature manuscript generation
[AD-A088884] N80-34152

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Mechanisms of erosion
[AD-A088571] N80-33498
Directional solidification of nonoxide eutectics
[AD-A088565] N80-33557
An investigation of the heat transfer at the liquid/solid interface of rapidly melting ice
[AD-A089099] N80-33722
The detection of atmospheric gravity waves by means of the wave interaction experiment N80-33989
Advances in multicriteria engineering design: Computational techniques. Multiobjective engineering design via nonlinear goal programming
[AD-A088570] N80-34190
Quantitative schlieren analysis of acoustic interaction with submerged plates
[AD-A089066] N80-34221

PENNSYLVANIA UNIV., PHILADELPHIA.
Fatigue failure criteria for unidirectional fiber composites
[AD-A089733] N80-33500

PHILIPS LABS., BRIARCLIFF MANOR, NEW YORK.
Development of an electrophoretic image display
[AD-A089121] N80-33729

PHILLIPS CARBON BLACK CO. LTD., PORT ELIZABETH (SOUTH AFRICA).
Energy conservation-air pollution abatement project N80-33939

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT, BRUNSWICK (WEST GERMANY).
Calibration of photovoltaic solar elements N80-33894

POLYTECHNIC INST. OF NEW YORK.
Elastic waves hexagonal honeycomb N80-33634
Optimum systems design with random input and output applied to solar water heating N80-33854

PORTLAND STATE UNIV., OREG.
Selective reflection of light at a solid-gas interface and its application N80-34244

PRINCETON UNIV., N. J.
Digital flight control research using microprocessor technology
[AD-A089147] N80-33417
Mechanisms responsible for topographical changes in PLT stainless steel and graphite limiters
[PPPL-1671] N80-33564
Study of high field effects in metal-aluminum oxide-silicon capacitors N80-33676
Superheating and boiling of water in hydrocarbons and of hydrocarbon mixtures N80-33709
Time series analysis of wind loadings on hyperbolic cooling towers N80-33772
Universal approximations of control systems over finite time N80-34208
Instantons and fermion densities N80-34273

PRINS MAURITS LAB. TNO, RIJSWIJK (NETHERLANDS).
Some comments on the Discussion on Explosion Hazards N80-33590
Description of research related to vapor cloud explosions in the Netherlands N80-33591

PSYCHO-LINGUISTIC RESEARCH ASSOCIATES, MENLO PARK, CALIF.
Synthesized voice approach callouts for air transport operations
[NASA-CR-3300] N80-34098

PUBLIC TECHNOLOGY, INC., WASHINGTON, D. C.
Improving building construction specifications in state and local governments
[NASA-CR-163623] N80-33612

PURDUE UNIV., LAFAYETTE, IND.
Coherent structures in the similarity region of a two-dimensional turbulent jet: A vortex street
[AD-A088750] N80-33720
A multispectral data simulation technique
[E80-10311] N80-33830
A model of plant canopy polarization response
[E80-10336] N80-33835

Q

QUEEN MARY COLL., LONDON (ENGLAND).
Some introductory concepts based on the unsteady flow about circular cylinders N80-33364
Some features of linear compressibility N80-33367
Role of unsteady aerodynamics in aircraft response N80-33371
Methods for inviscid subsonic flows about unsteady aerofoils N80-33375

QUEENSBOROUGH COMMUNITY COLLEGE, BAYSIDE, N. Y.
Intercommunications in real time, redundant, distributed computer system
[NASA-CR-163604] N80-33642

R

R AND D ASSOCIATES, MARINA DEL REY, CALIF.
Perspectives on research on LNG vapor cloud dispersion N80-33593

RADIAN CORP., AUSTIN, TEX.
Stack gas reheat evaluation
[PB80-196850] N80-33980

RADIAN CORP., MCLEAN, VA.
The revised organic chemical producers data base system
[PB80-199805] N80-34287

RAND CORP., SANTA MONICA, CALIF.
Military weather calculations for the NATO theater: Weather and Warplanes 8
[AD-A088549] N80-34033
Aerosol modelling for optical weather
[AD-A088583] N80-34034

RANGE COMMANDERS COUNCIL, WHITE SANDS MISSILE RANGE, N. MEX.
IBIG standard for pulse repetition frequencies and reference oscillator frequency for C-band radars
[AD-A088545] N80-33666

RCA GOVERNMENT SYSTEMS DIV., BURLINGTON, MASS.
A 2.06 micron-laser rangefinder technology
[AD-A088636] N80-33737

RCA LABS., PRINCETON, N. J.
Single-mode laser studies: Design and performance of a fixed-wave length source and coupling of lasers to thin-film optical waveguides
[NASA-CR-3341] N80-33735
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/1] N80-33914

REGIS COLL., WESTON, MASS.
In-flight characteristics of the topside ionospheric monitor (SSIE) on the DMSP satellite flight 2 and flight 4
[AD-A088879] N80-34005

RENSSELAER POLYTECHNIC INST., TROY, N. Y.
A linear photodiode array employed in a short range laser triangulation obstacle avoidance sensor
[NASA-CR-163613] N80-33747

RICE UNIV., HOUSTON, TEX.
X-ray diffraction study of the structure of boron in vapor-deposited boron fibers N80-33484
Effective depth of spectral line formation in planetary atmospheres
[NASA-CR-163617] N80-34319

ROCKWELL INTERNATIONAL CORP., DOWNEY, CALIF.
Satellite Power Systems (SPS) concept definition study. Volume 2, part 2: System engineering
[NASA-CR-3319] N80-33969

ROYAL AIRCRAFT ESTABLISHMENT, BEDFORD (ENGLAND).
Experimental techniques in unsteady aerodynamics N80-33373

ROYAL AUSTRALIAN NAVY RESEARCH LAB., EDGECLIFF.
Climatic maps of the sea surface-air difference in vapour pressure and in potential temperature over the eastern Indian Ocean
[AD-A089022] N80-34050

ROYAL INST. OF TECH., STOCKHOLM (SWEDEN).
Steady state spurious errors in shock-capturing numerical schemes
[KTH-AERO-TN-60] N80-33353

ROYAL NETHERLANDS AIRCRAFT FACTORIES FOKKER, SCHIPHOL-OOST.
The ECS solar array N80-33879

ROYAL SIGNALS AND RADAR ESTABLISHMENT, MALVERN (ENGLAND).
Structure, mechanism and prediction of orographically enhanced rain in Britain N80-33514
RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N. J.
Size effects in superfluid 3He N80-33610
Theoretical and numerical analyses of anelastic materials at finite strain N80-33761
A study of the magnitude and distribution of the stresses in the end-block of a post-tensioned prestressed concrete beam N80-33771
Analysis of ordered and partially ordered categorical data N80-34196
Molecular beam chemiluminescent investigation of the inelastic collisions of rare gas metastable atoms N80-34223
RUTGERS - THE STATE UNIV., PISCATAWAY, N. J.
Study of strain distribution in helium implanted vanadium three silicon by the divergent X-ray beam method N80-33548
Numerical studies of dispersion processes in two dimensional, homogeneous, decaying turbulence N80-33700

S

SAN DIEGO AIRCRAFT ENGINEERING, INC., CALIF.
Conceptual point design study of a new CTOL SETOLS CAS aircraft for 1995 IOC [AD-A086351] N80-33400
SANDIA LABS., ALBUQUERQUE, N. MEX.
Pulsed power accelerators for particle beam fusion [SAND-80-0558C] N80-34239
SAVOIA LABS., LIVERMORE, CALIF.
Assessment of seabed seismic systems [PB80-195985] N80-34010
SANTA CLARA UNIV., CALIF.
Methanol/ethanol/gasoline blend fuels demonstration with stratified charge engine vehicles [PB80-192123] N80-33606
On one-dimensional stretching functions for finite-difference calculations [NASA-CR-3313] N80-34188
SCIENCE APPLICATIONS, INC., TUCSON, ARIZ.
Able image chain analysis. Revision [AD-A088953] N80-33651
SCIENTIFIC RESEARCH ASSOCIATES, INC., GLASTONBURY, CONN.
Computation of discrete hole film cooling flow [AD-A088807] N80-33723
SHEFFIELD UNIV. (ENGLAND).
Vaporization of droplets in premixing chambers [NASA-CR-163615] N80-33714
SHOCK AND VIBRATION INFORMATION CENTER (DEFENSE), WASHINGTON, D. C.
The Shock and Vibration Digest, volume 12, number 8 [AD-A088939] N80-33758
SIKORSKY AIRCRAFT, STRATFORD, CONN.
Analysis and correlation of test data from an advanced technology rotor system [NASA-CR-152366] N80-33351
An evaluation of a computer code based on linear acoustic theory for predicting helicopter main rotor noise [NASA-CR-159339] N80-34217
SIMULA, INC., TEMPE, ARIZ.
Aircraft crash survival design guide. Volume 3: Aircraft structural crashworthiness [AD-A089104] N80-33385
SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
Investigation of electrodynamic stabilization and control of long orbiting tethers [NASA-CR-161584] N80-33748
SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, CANNES (FRANCE).
SPOT solar array N80-33880
SOCIETY OF EXPERIMENTAL TEST PILOTS, LANCASTER, CALIF.
Technical Review, volume 15, no. 1 [ISSUE-1] N80-33337
SOUTH CAROLINA UNIV., COLUMBIA.
Evaluation of solid adsorbents for collecting atmospheric chlorinated hydrocarbons [PB80-196526] N80-33878
Geologic implications of regional scale variation in lunar crater shape. Fourier crater shape analysis N80-34312
SOUTH DAKOTA STATE UNIV., BROOKINGS.
Impact of cell size on inventory and mapping errors in a cellular geographic information system [E80-10315] N80-33831
SOUTHERN METHODIST UNIV., DALLAS, TEX.
Mode structure of Al sub xGa sub 1-xAs injection lasers N80-33733
Theory and design of unidirectional error codes N80-34141
Some screening procedures based on data from a singly truncated bivariate normal distribution N80-34200
SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
Special engineering services to establish inspection criteria for bearings to improve life prediction [AD-A088765] N80-33754
SPECTROLAB, INC., SYLMAR, CALIF.
Thin, high efficiency silicon solar cells N80-33885
SPIRE CORP., BEDFORD, MASS.
Research on low temperature, directed energy processing of very large scale integrated structures [AD-A088562] N80-33521
SRI INTERNATIONAL CORP., MENLO PARK, CALIF.
Fluorinated desensitizing ingredients for propellants [AD-A088704] N80-33598
Propagation modeling and evaluation of communication system performance in nuclear environments [AD-A088914] N80-33864
Development and evaluation of a prototype automated telephotometer system [EPRI-EA-1434] N80-33731
Solar network support for LIPAQ utilization in conjunction with project MABLE [PB80-192909] N80-33977
Atmospheric/ionospheric/magnetospheric h using the Chatanika radar [AD-A088915] N80-34004
Development and validation of methods for sampling and analysis of workplace toxic substances [PB80-194574] N80-34095
Theoretical study of state-to-state collisions [AD-A088746] N80-34270
STANFORD UNIV., CALIF.
Microwave tubes [AD-A088745] N80-33698
Cytochemical studies of planetary microorganisms explorations in exobiology [NASA-CR-163605] N80-34057
On the convergence of a block successive overrelaxation method for a class of linear complementarity problems [AD-A088780] N80-34154
Single chip lenses for ultrasonic imaging [AD-A088957] N80-34220
The minimum flux corona; theory or concept [NASA-CR-163636] N80-34328
Extreme ultra-violet emission from coronal structures [AD-A087803] N80-34329
Coronal heating by stochastic magnetic pumping [NASA-CR-163637] N80-34330
STATE UNIV. OF NEW YORK, STONY BROOK.
Parameter estimation in undetermined systems N80-34172
STATE UNIV. OF NEW YORK AT ALBANY.
A study of ice nucleus concentrations in eastern New York State N80-34017
STATE UNIV. OF NEW YORK AT BUFFALO.
Diffusion controlled current at a stationary finite disk electrode. Experiment [AD-A089063] N80-33692
Elastic plate vibrations by boundary integral equations. Part 1: Infinite phase [AD-A089105] N80-33806
STATE UNIV. OF NEW YORK AT STONY BROOK.
Selected studies in classical and quantum field theory N80-34274
STONE AND WEBSTER ENGINEERING CORP., BOSTON, MASS.
Hydroprocessing of light pyrolysis fuel oil for kerosene type jet fuel [AD-A089101] N80-33598
STURTEVANT GAS CLEANING LTD., LONDON (ENGLAND).
Operating experiences with improved rapping on electrostatic precipitators treating fly ash from high and low sulphur coals N80-33956
SYSTEMS RESEARCH LABS., INC., DAYTON, OHIO.
Dynamic evaluation of experimental integral fuel-tank sealants, part 1 [AD-A088573] N80-33573

T

TECHNISCHE HOGESCHOOL, DELFT (NETHERLANDS).
Stress gradients around notches [LR-297] N80-33779
Some formulas for the crack opening stress level [M-369] N80-33780
TECHNISCHE UNIVERSITAET, BRUNSWICK (WEST GERMANY).
Properties of solar generators with reflectors and radiators N80-33901
TECHNOLOGY REPORTS CENTRE, ORPINGTON (ENGLAND).
Mechanization systems and operations N80-34292
TEL-AVIV UNIV. (ISRAEL).
Interaction of electrons and electromagnetic waves in periodic structures [AD-A088739] N80-33662
TELDIX LUFTFAHRT-AUSRUESTUNGS G.M.B.H., HEIDELBERG (WEST GERMANY).
Bearing And Power Transfer Assembly (BAPTA) with rotary transformer N80-33902
TENNESSEE EASTMAN CORP., OAK RIDGE.
NASTRAN analysis of heat-transfer fluid fill pipe failure N80-33790
TEXAS A&M UNIV., COLLEGE STATION.
The development of mixture injected surface-ignition engine N80-33519
Identifications and forecasting of the potential for the occurrence of extended-range VHF-UHF transhorizon propagation from synoptic-scale data N80-33630
Analysis of Markov renewal processes with some nonregeneration points and their applications to reliability theory N80-33753
Development of a soil moisture model for use with passive microwave remote sensors N80-33828
Origin and occurrence of selected world wide colorete deposits N80-33984
Changes in the potential for wind energy generation due to terrain modification of the atmospheric boundary-layer flow N80-34020
A numerical study of motion and spindown characteristics of an isolated cyclonic oceanic vortex N80-34045
A language for designing software systems N80-34137
How near is a near-optimal solution: Confidence limits for the global optimum [AD-A089108] N80-34203
Evaluation of precedence criteria for project scheduling under resource constraints [AD-A089070] N80-34282
TEXAS TECHNOLOGICAL UNIV., LUBBOCK.
Geometrically nonlinear analysis of rectangular glass panels by the finite element method N80-33776
Effect of task variable interactions in lifting and lowering N80-34090
Analysis of unstable optical resonators [AD-A088600] N80-34255
TEXAS UNIV., AUSTIN.
Four lectures on Poincare gauge field theory [ORO-3992-280] N80-34279
TEXAS UNIV. AT ARLINGTON.
DCT/DPCM processing of NTSC composite videosignal N80-33635
Interfield hybrid coding of NTSC component video signals N80-33636
Differences in certain physiological, biomechanical, and subjective measures of work effect between males and females while backpacking N80-34089
The application of generalized group inverse to discrete finite Markov chains N80-34195
TEXAS UNIV. AT AUSTIN.
Flows in the annular region when an underexpanded nozzle is exhausted into a stepped launch tube [AD-A088581] N80-33477

Modeling of heat and mass transfer during coal block gasification N80-33577
Analysis of in-line flow-induced vibrations using linearization methods N80-33710
A modeling technique for design and simulation of hydrostatic journal bearings N80-33745
Numerical analysis of equilibrium problems in incompressible nonlinear elasticity N80-33763
Impact force prediction using measured frequency response functions N80-33773
Behavior classification of short reinforced concrete columns subjected to cyclic deformations N80-33774
Evaluation of hydropower potential in a river basin N80-33856
A multi-site magnetotelluric measurement system with real time data analysis N80-33998
Determining the three-dimensional motion and model of objects from a sequence of images N80-34136
A graph theory approach to software evaluation N80-34145
Stochastic network with recourse N80-34158
An investigation of type 1 error rate for approximate F tests of linear combinations of mean squares N80-34175
Three wave nonlinear interactions in dispersive media N80-34245
A methodology for logical design of databases for project engineering N80-34265
A study of the 10830 A line of neutral helium in the spectra of red giants N80-34303
N-body simulations of stellar systems containing massive black holes N80-34309
Two astrophysical problems in late-type peculiar stars. Calcium in super-metal-rich stars; and carbon nitrogen and oxygen in weak G-band stars N80-34311

TEXAS UNIV. AT EL PASO.
The design and implementation of a computerized data reduction system [AD-A088734] N80-34007

TOKYO UNIV. (JAPAN).
A film of large scale field experiments on ethylene hazards N80-33589

TOTAL ENVIRONMENTAL ACTION, INC., HARRISVILLE, N.H.
Development of a site-fabricated, building integrated air solar system [ALO-4123-5] N80-33913

TRANSPORTATION SYSTEMS CENTER, CAMBRIDGE, MASS.
Detection and assessment of secondary sonic booms in New England [AD-A088160] N80-33362
Potential of diesel engine, diesel engine design concepts, control strategy and implementation [PB80-195746] N80-33752
Voice response system statistics program, operational handbook [AD-A089109] N80-34031

TRW DEFENSE AND SPACE SYSTEMS GROUP, REDONDO BEACH, CALIF.
Carbon fiber plume sampling for large scale fire tests at Dugway Proving Ground [NASA-CR-159215] N80-33492

TULANE UNIV., NEW ORLEANS, LA.
Mathematical simulation of the transport of oxygen and important metabolites in the human brain N80-34092

U

UNITED TECHNOLOGIES CORP., SOUTH WINDSOR, CONN.
Coal gasification combined-cycle system analysis [EPRI-AP-1390] N80-33801

UNITED TECHNOLOGIES RESEARCH CENTER, EAST HARTFORD, CONN.
Evaluation of amorphous ribbon reinforced resin matrix composites [AD-A089102] N80-33501

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES.
Assigning reactive excited states in inorganic photochemistry [AD-A088566] N80-33521
Relativistic electron precipitation: An observational study N80-33827

UNIVERSITY OF SOUTHERN COLORADO, PUEBLO.
RAMP: A fault tolerant distributed microcomputer structure for aircraft navigation and control [NASA-CR-163615] N80-33415

UTAH STATE UNIV., LOGAN.
Two tests of electric fields, second-order in source-velocity terms of closed steady currents. 1: An electron beam. 2: A superconducting coil N80-33674

UTAH UNIV., SALT LAKE CITY.
Positron annihilation gamma ray lineshape studies of defects in solids [AD-A088856] N80-34267
A precise measurement of the sidereal anisotropy of cosmic rays near 1500 GV N80-34336

V

VARIAN ASSOCIATES, PALO ALTO, CALIF.
High power millimeter wave amplifier [AD-A088591] N80-33695

VECTOR ENGINEERING, INC., SPRINGFIELD, N. J.
Rankine bottoming cycle safety analysis [DOE/ET-15445/T1] N80-33912

VIRGINIA POLYTECHNIC INST., BLACKSBURG.
Generalized inverses and their application to applied probability problems [AD-A089069] N80-34207

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Introduction to unsteady boundary layers N80-33365
Experimental techniques for unsteady boundary layers N80-33374
Analytical methods for prediction of unsteady laminar boundary layers N80-33376
Analytical methods for prediction of unsteady turbulent boundary layers N80-33377
Influence of stress interaction on the behavior of off-axis unidirectional composites [NASA-CR-163618] N80-33495
Development and application of analytical techniques to chemistry of donor solvent liquefaction [DOE/PC-20041/T1] N80-33520
Stress intensity distributions for natural flaw shapes approximating benchmarch geometries [PB80-200785] N80-33810

VIRGINIA UNIV., CHARLOTTESVILLE.
An investigation of the electrochemical behavior of graphite fiber-polymer composites N80-33485
Aspects of ionization and sputtering in the glow discharge by solids mass spectrometry N80-33508
Development of a scanning electron microscope based microanalytical system N80-33512
HVEM studies of helium embrittlement in stainless steel N80-33547
A numerical simulation of the influence of heat and moisture fluxes upon mesoscale circulations N80-34015
WQ 2059-247: An unusual high redshift X-ray cluster [NASA-CR-163619] N80-34367

W

WASHINGTON UNIV., SEATTLE.
Radiative capture studies of the electromagnetic decays of highly excited states [DOE/ER-01388/043] N80-33867
Orographic effects in the atmospheres of other planets N80-33822
Monitoring by aerial and terrestrial photogrammetry [PB80-192925] N80-33976
High temperature gas energy transfer [AD-A089129] N80-34235
Synthesis of generalized coherent optical processor [AD-A088669] N80-34253

WASHINGTON UNIV., ST. LOUIS, MO.
A study of human throat-wall and vocal tract fron input/output measurements N80-34091

WAYNE STATE UNIV., DETROIT, MICH.
The burning velocity inside a spark-ignition engine with different turbulent promoters N80-33746
Nonstationary random response of structural systems to aerodynamic wind forces N80-33775

YALE UNIV., NEW HAVEN, CONN.
Total and differential scattering cross section measurements for positrons and electrons colliding with inert gases N80-34227
Quantum field-theoretical electromagnetic and gravitational two-particle potentials N80-34275

WEIDLINGER ASSOCIATES, NEW YORK.
Uncoupling approximation in fluid-structure interaction problems with cavitation [AD-A089011] N80-33725

WESTLAND HELICOPTERS LTD., YEOVIL (ENGLAND).
A qualitative discussion of dynamic stall N80-33368
Unsteady flows associated with helicopter rotors N80-33370
Application of identical aerodynamic functions N80-33372
Prediction methods for unsteady separated flows N80-33378

WITWATERSRAND UNIV., JOHANNESBURG (SOUTH AFRICA).
Background aerosol concentrations for the Namib-Atlantic interface N80-33857

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Effects of bottom topography on ocean currents N80-33817
Assessment of seabed seismic systems [PB80-195995] N80-34010

WORLD METEOROLOGICAL ORGANIZATION, GENEVA (SWITZERLAND).
Orographic effects in planetary flows [GARP-PUBL-23] N80-33811

WORMSER SCIENTIFIC CORP., STAMFORD, CONN.
Installation, operation, and maintenance for the pyramidal optics solar system installed at Yacht Cover, Columbia, South Carolina [NASA-CR-161203] N80-33864
Design data brochure for a pyramidal optical solar system [NASA-CR-161202] N80-33865

WYLE LABS., INC., HAMPTON, VA.
A feasibility study of a 3-D finite element solution scheme for aeroengine duct acoustics [NASA-CR-159359] N80-34218

WYOMING UNIV., LARAMIE.
Statistical classification of ice particles and raindrops by pattern recognition techniques N80-34021

Y

YALE UNIV., NEW HAVEN, CONN.
Real-time telephone traffic simulation using learning automata routing [S/IS-7909] N80-34148
Simulation study of telephone traffic routing using learning algorithms, part 2 [S/IS-7907-PT-2] N80-34149
Learning algorithms for two person zero-sum stochastic games with incomplete information: A unified approach [S/IS-7906] N80-34150
Application of a hierarchical structure stochastic learning automation [S/IS-7908] N80-34151

CONTRACT NUMBER INDEX

Typical Contract Number Index Listing

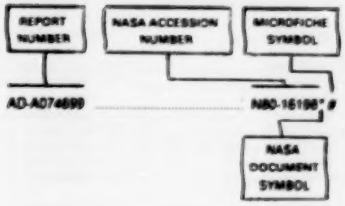
Listings in this index are arranged alpha-numerically by contract number. Under each contract number the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

AF PROJ. C854 ..... N80-33461
AF PROJ. 0170 ..... N80-33663
AF PROJ. 1123 ..... N80-33421
AF PROJ. 2029 ..... N80-33661
AF PROJ. 2051 ..... N80-33405
AF PROJ. 2103 ..... N80-33420
AF PROJ. 2301 ..... N80-33662
N80-34255
N80-34270
AF PROJ. 2303 ..... N80-33423
N80-33481
N80-34238
AF PROJ. 2304 ..... N80-34191
N80-34192
N80-34205
AF PROJ. 2305 ..... N80-33655
AF PROJ. 2306 ..... N80-33502
AF PROJ. 2307 ..... N80-33359
N80-33360
N80-33499
N80-33802
N80-33803
N80-33804
N80-33805
AF PROJ. 2310 ..... N80-34002
AF PROJ. 2311 ..... N80-34331
AF PROJ. 2313 ..... N80-34100
AF PROJ. 2371 ..... N80-34005
AF PROJ. 2401 ..... N80-33801
AF PROJ. 2403 ..... N80-33402
AF PROJ. 2418 ..... N80-33558
N80-33561
AF PROJ. 2419 ..... N80-33501
AF PROJ. 2421 ..... N80-33573
AF PROJ. 3066 ..... N80-33411
N80-33413
N80-33414
AF PROJ. 3145 ..... N80-33908
AF PROJ. 3448 ..... N80-34220
AF PROJ. 4594 ..... N80-34152
N80-34153
AF PROJ. 4643 ..... N80-34003
AF PROJ. 6670 ..... N80-34037
AF PROJ. 7629 ..... N80-34254
AF PROJ. 9767 ..... N80-34234
AF PROJ. 9991 ..... N80-34156
AF-AFOSR-2810-75 ..... N80-34267
AF-AFOSR-2927-76 ..... N80-34205
AF-AFOSR-3013-76 ..... N80-33802
N80-33803
N80-33804
N80-33805
AF-AFOSR-3083-76 ..... N80-33669
AF-AFOSR-3184-77 ..... N80-34100
AF-AFOSR-3260-77 ..... N80-34001
AF-AFOSR-3278-77 ..... N80-34255
AF-AFOSR-3351-77 ..... N80-33688
AF-AFOSR-3394-77 ..... N80-33481
AF-AFOSR-3445-77 ..... N80-33662
AF-AFOSR-3519-78 ..... N80-34192
AF-AFOSR-3635-78 ..... N80-33360
AF-AFOSR-3640-78 ..... N80-33499
ARB-A7-184-309 ..... N80-33977
ARPA ORDER 345 ..... N80-34159
ARPA ORDER 3175.17 ..... N80-33456
ARPA ORDER 3192 ..... N80-33695
ARPA ORDER 3211 ..... N80-33456
N80-34269
ARPA ORDER 3214 ..... N80-33456
ARPA ORDER 3448 ..... N80-34220
ARPA ORDER 3718 ..... N80-34237
ARPA ORDER 3751 ..... N80-33490
ARPA ORDER-3724 ..... N80-33736
DA PROJ. 1L1-61101-A-91A N80-33724
DA PROJ. 1L1-61102-AH-44 ..... N80-33682
DA PROJ. 1L1-61102-BH-57 ..... N80-33563
DA PROJ. 1L1-62105-AH-94 ..... N80-33738
DA PROJ. 1L1-62209-AH-76 ..... N80-33385
N80-33403
DA PROJ. 1L2-62209-AH-16 ..... N80-33422
DA PROJ. 1T1-61101-A-91A N80-33854
DA PROJ. 1T1-61102-BH-57 ..... N80-34189
DA PROJ. 4A1-61102-B-52A N80-33853
DA-ERO-75-G-035 ..... N80-34202
DA-ERO-78-G-066 ..... N80-34189
DAAA21-76-C-0221 ..... N80-33800
DAAB07-77-C-2157 ..... N80-33737
DAAD07-78-C-0010 ..... N80-34007
DAAG29-77-C-0045 ..... N80-34034
DAAG29-77-C-0100 ..... N80-33498
DAAG29-77-G-0025 ..... N80-33563
DAAG29-77-G-0057 ..... N80-33557
DAAG29-77-G-0133 ..... N80-34271
DAAG29-79-C-0104 ..... N80-33498
DAAG29-79-C-0161 ..... N80-34278
DAAG29-79-G-0019 ..... N80-33563
DAAG29-79-G0020 ..... N80-33557
DAAJ02-77-C-0003 ..... N80-33422
DAAJ02-77-C-0021 ..... N80-33385
DAAK40-79-C-0021 ..... N80-33477
DAAK51-78-C-0011 ..... N80-33403
DAAK70-77-C-0166 ..... N80-33848
DAAK70-77-C-0194 ..... N80-34269
DAAK80-79-D-0256 ..... N80-33650
DARPA ORDER 3802 ..... N80-33729
DE-AC01-79ET-23108 ..... N80-33914
DE-AC01-79PE-70048 ..... N80-33602
DE-AC02-76CH-03073 ..... N80-33564
DE-AC02-80ER-10556 ..... N80-33565
DE-AC03-76SF-00326 ..... N80-34154
DE-AC04-76DP-00053 ..... N80-33603
N80-33604
DE-AC04-76DP-00789 ..... N80-33911
N80-34239
DE-AC05-79ET-15445 ..... N80-33912
DE-AC06-76ER-01388 ..... N80-33667
DE-AC06-76RL-01830 ..... N80-33605
DE-AC08-78DP-40030 ..... N80-33741
DE-AC09-78ET-35900 ..... N80-33730
DE-AC22-80PC-20041 ..... N80-33520
DE-AI01-76ET-12548 ..... N80-34093
DE-AI01-79ET-20305 ..... N80-33862
DE-AM03-76SF-01101 ..... N80-33523
DE-AS05-76ER-03992 ..... N80-34279
DE-AT03-76ER-72018 ..... N80-34154
DE-A101-79ET-27025 ..... N80-33919
DE-FG04-77CS-34123 ..... N80-33913
DEN3-31 ..... N80-33859
N80-33860
N80-33861
DEN3-134 ..... N80-33862
DI-14-34-0001-9027 ..... N80-33951
DNA001-77-C-0038 ..... N80-33664
DNA001-77-C-0042 ..... N80-34004
DNA001-78-C-0189 ..... N80-33665
DNA001-78-C-0373 ..... N80-34206
DNA001-79-C-0078 ..... N80-33725
DNA001-79-C-0256 ..... N80-33725
DOT-AT-80015 ..... N80-34296
DOT-FA76WAI-622 ..... N80-34032
DOT-FA77WA-4055 ..... N80-33965
DOT-FA78WA-4192 ..... N80-33967
DOT-FA78WA-4207 ..... N80-33412
DOT-FA79WAI-020 ..... N80-34036
EC-77-A-31-1042 ..... N80-34297
N80-34298
EC-77-C-01-5085 ..... N80-33909
EF-77-A-01-2593 ..... N80-33556
EM-78-F-01-5199 ..... N80-33958
EPA-R-804716 ..... N80-33978
EPA-65-02-2699 ..... N80-34288
EPA-68-01-4839 ..... N80-33970
EPA-68-02-2541 ..... N80-33981
EPA-68-02-2642 ..... N80-33980
EPA-68-02-2977 ..... N80-33974
EPA-68-03-2153 ..... N80-33649
EPA-68-03-2623 ..... N80-34287
EPRI PROJ. 952-14 ..... N80-33731
EPRI PROJ. 995-2 ..... N80-33601
EX-76-A-36-1008 ..... N80-33919
EY-76-C-06-1830 ..... N80-33605
FAA PROJ. 075-725-210 ..... N80-33386
FAA PROJ. 131-401-835 ..... N80-34105
F08635-79-C-0266 ..... N80-33420
F09603-74-C-5158 ..... N80-33754
F10628-78-C-0198 ..... N80-33655
F19628-77-C-0122 ..... N80-34005
F19628-77-C-0189 ..... N80-34231
F19628-80-C-0002 ..... N80-33661
N80-33805
N80-33726
F30602-77-C-0136 ..... N80-33663
F30602-78-C-0011 ..... N80-33695
F30602-78-C-0017 ..... N80-34152
F30602-78-C-0114 ..... N80-34160
F30602-78-C-0253 ..... N80-34153
F30602-79-C-0018 ..... N80-34278
F30602-79-C-0087 ..... N80-33461
F33615-75-C-5218 ..... N80-33405
F33615-77-C-2036 ..... N80-33750
F33615-77-C-5052 ..... N80-33502
F33615-78-C-1562 ..... N80-34254
F33615-78-C-2058 ..... N80-33908
F33615-78-C-2060 ..... N80-33413
F33615-78-C-2074 ..... N80-33599
F33615-78-C-5063 ..... N80-33501
F33615-78-C-5098 ..... N80-33573
F33615-78-C-5201 ..... N80-33561
F33659-79-C-0178 ..... N80-33851
F49620-75-C-0073 ..... N80-34270
F49620-76-C-0057 ..... N80-33359
F49620-77-C-0023 ..... N80-34033
F49620-77-C-0133 ..... N80-34220
F49620-78-C-0015 ..... N80-34234
F49620-78-C-0038 ..... N80-33723
F49620-79-C-0128 ..... N80-34191
F49620-79-C-0167 ..... N80-34238
JPL-954880 ..... N80-33747
MDA903-78-C-0252 ..... N80-33456
MDA903-79-C-0212 ..... N80-33621
MDA903-79-C-0439 ..... N80-33729
MDA903-80-C-0214 ..... N80-33456
MDA903-80-C-0353 ..... N80-33456
MRI PROJ. 4396-L N80-33981
NAGW-5 ..... N80-34322
NAG2-2 ..... N80-33415
NAG8-308 ..... N80-34307
NASA ORDER A-50807-B N80-33718
NASA ORDER A-64184-B N80-34098

NASA ORDER C-33350-D N80-33476
NASW-3133 ..... N80-33612
NASW-3199 ..... N80-33348
N80-33425
N80-33453
NAS1-12308 ..... N80-33496
NAS1-14611 ..... N80-33392
NAS1-14631 ..... N80-33394
NAS1-14949 ..... N80-33355
NAS1-14948 ..... N80-33382
NAS1-15084 ..... N80-33354
NAS1-15236 ..... N80-33490
NAS1-15465 ..... N80-33492
NAS1-15508 ..... N80-33488
NAS1-15509 ..... N80-33487
NAS1-15526 ..... N80-34219
NAS1-15562 ..... N80-33497
NAS2-6107 ..... N80-33401
NAS2-10127 ..... N80-33397
NAS2-10145 ..... N80-33398
NAS2-10211 ..... N80-33351
NAS2-10267 ..... N80-33396
NAS2-10505 ..... N80-33381
NAS3-20643 ..... N80-33408
NAS4-2616 ..... N80-33350
NAS5-11431 ..... N80-33450
N80-33451
NAS5-25762 ..... N80-34322
NAS7-100 ..... N80-33427
N80-33448
N80-33454
N80-33494
N80-33639
N80-33679
N80-34022
N80-34093
N80-34250
N80-34320
N80-34328
NAS8-31747 ..... N80-34111
NAS8-32245 ..... N80-33986
N80-33987
NAS8-32250 ..... N80-33964
N80-33965
NAS8-32475 ..... N80-33989
NAS8-33558 ..... N80-33992
NAS8-33578 ..... N80-33479
NAS8-33691 ..... N80-33748
NAS8-33814 ..... N80-34327
NAS8-15290 ..... N80-34101
N80-34102
N80-34103
N80-34104
NAS8-15486 ..... N80-33830
NAS8-15800 ..... N80-33832
NCCI-6 ..... N80-34215
NCC1-15 ..... N80-33495
NCC2-64 ..... N80-33717
NGL-05-020-272 ..... N80-34328
N80-34330
NGL-42-003-007 ..... N80-33831
NGR-05-020-004 ..... N80-34057
NGR-06-002-112 ..... N80-33476
NGR-14-005-181 ..... N80-33998
NR PROJ. 042-043 ..... N80-34204
NR PROJ. 042-403 ..... N80-34165
NR PROJ. 047-048 ..... N80-34154
NR PROJ. 047-179 ..... N80-34203
N80-34282
NR PROJ. 048-383 ..... N80-34159
NR PROJ. 051-736 ..... N80-33559
NR PROJ. 083-400 ..... N80-33817
NR PROJ. 315-001 ..... N80-34241
NR PROJ. 350-005 ..... N80-34253
NR PROJ. 356-646 ..... N80-33574
NRL PROJ. R08-73 ..... N80-33657
N80-33658
N80-33686
NSF ATM-76-01773 ..... N80-33996
NSF ATM-78-05224 ..... N80-33996
NSF ATM-79-12308 ..... N80-33996
NSF ATM-79-21765 ..... N80-33996
NSF ATM-79-09962 ..... N80-33996
NSF ECS-79-19980 ..... N80-34159
NSF ECS-79-26320 ..... N80-34154
NSF ENG-74-20780 ..... N80-33720
NSF ENG-76-20824 ..... N80-33810
NSF ENG-77-12946 ..... N80-33689
NSF ENG-77-22757 ..... N80-34207
NSF GK-19317 ..... N80-33720
NSF MCS-79-05774 ..... N80-34276
NSF OCE-78-19833 ..... N80-33819
NSF OCE-78-25405 ..... N80-33817
NSF PHY-79-26582 ..... N80-34279
NSG-1343 ..... N80-33926
NSG-1414 ..... N80-33449
NSG-1429 ..... N80-33570
NSG-1448 ..... N80-33448
NSG-1477 ..... N80-33926
NSG-1577 ..... N80-34178
NSG-2086 ..... N80-34188
NSG-5213 ..... N80-33996
NSG-5285 ..... N80-33991
NSG-5340 ..... N80-34023
NSG-7043 ..... N80-34319
NSG-7342 ..... N80-34326
NSG-7389 ..... N80-33747
NSG-7461 ..... N80-33462
NSG-7506 ..... N80-33996
NSG-7517 ..... N80-33714
NSG-7610 ..... N80-33993
NSG-7634 ..... N80-34321
NSG-8160 ..... N80-34057
N00014-71-C-0108 ..... N80-33806
N00014-75-C-0127 ..... N80-33659
N00014-75-C-0196 ..... N80-33800
N00014-75-C-0267 ..... N80-34154
N00014-75-C-0476 ..... N80-34261
N00014-75-C-0621 ..... N80-34154
N00014-75-C-0673 ..... N80-34329
N80-34330
N00014-75-C-0890 ..... N80-34235
N00014-75-C-1048 ..... N80-33720
N00014-75-C-1183 ..... N80-34159
N00014-76-C-0197 ..... N80-33817
N00014-76-C-0276 ..... N80-34276
N00014-76-C-0279 ..... N80-33689
N00014-76-C-0522 ..... N80-34253
N00014-76-C-0545 ..... N80-33521
N00014-76-C-0807 ..... N80-33560
N00014-77-C-0125 ..... N80-34241
N00014-77-C-0311 ..... N80-33574
N00014-77-C-0582 ..... N80-33809
N00014-77-C-0743 ..... N80-34207
N00014-78-C-0257 ..... N80-33417
N00014-78-C-0426 ..... N80-34203
N80-34282
N00014-78-C-0543 ..... N80-34165
N80-34204
N00014-78-C-0544 ..... N80-33500
N00014-79-C-0067 ..... N80-34051
N00014-79-C-0484 ..... N80-34030
N00014-79-C-0644 ..... N80-33693
N00014-80-C-0539 ..... N80-33559
N00019-79-C-0171 ..... N80-33498
N00019-79-C-0385 ..... N80-33680
N00019-79-WR-91472 ..... N80-33503
N00024-79-C-5853 ..... N80-33598
N00024-79-C-6043 ..... N80-33722
N80-34221
N00039-78-C-0405 ..... N80-33456
N00039-79-C-0386 ..... N80-33456
N00173-73-C-0028 ..... N80-34268
N62269-79-C-0438 ..... N80-33400
N62269-79-C-0706 ..... N80-33401
OSURF PROJ. 711055 ..... N80-33991
PHS-NIOSH-210-0123 ..... N80-34095
PROJ. AGRISTARS N80-33830
N80-33832
RR0110941 ..... N80-33739
RR0210346 ..... N80-33687
RR0230141 ..... N80-34277
RR0230301 ..... N80-33808
RR0240202 ..... N80-33596
RR0320801 ..... N80-33652
SRI PROJ. PYU-8742 ..... N80-33598
W-7405-ENG-36 ..... N80-33564
N80-33726
N80-33755
W-7405-ENG-48 ..... N80-33594
N80-33740
N80-34240
WF3354591 ..... N80-33597
WF54591201 ..... N80-33503
148-20-10-07 ..... N80-33928
148-40-01-01 ..... N80-34048
199-20-10 ..... N80-34056
505-04 ..... N80-33749
505-09-41 ..... N80-33398
505-10-13-06 ..... N80-33355
505-24-11 ..... N80-33351
505-31-11-06 ..... N80-34188
505-31-13-02 ..... N80-33418
505-31-53-01 ..... N80-33480
505-31-83-02 ..... N80-33716
505-32 ..... N80-33357
N80-33410
505-32-02 ..... N80-34218
505-33-21 ..... N80-33493
505-33-33-02 ..... N80-33570
N80-33571
505-33-53-01 ..... N80-33358
505-33-53-02 ..... N80-33393
505-34-33-02 ..... N80-33416
505-35-21 ..... N80-34097
N80-34098
505-35-31 ..... N80-34099
505-41-73-01 ..... N80-33384
505-42-21 ..... N80-33349
N80-33356
N80-33555
506-53 ..... N80-33715
506-53-53 ..... N80-33778
506-53-53-01 ..... N80-33998
506-61-53-01 ..... N80-33683
506-61-53-04 ..... N80-33342
517-53-43-01 ..... N80-33777
523-03-11 ..... N80-34096
530-04-13-01 ..... N80-33348
533-01-43-01 ..... N80-33347
533-01-43-02 ..... N80-33490
534-03-23 ..... N80-33491
534-03-23-01 ..... N80-33492
N80-33404
534-04-13-52 ..... N80-33408
535-01-12 ..... N80-33483
541-01-13-01 ..... N80-33927
691-09-02-01 ..... N80-33396
791-40-11 .....

REPORT/ACCESSION NUMBER INDEX

Typical Report/Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A-8024 ..... N80-33356* #
A-8099 ..... N80-34056* #
A-8104 ..... N80-34099* #
A-8239 ..... N80-33349* #
A-8294 ..... N80-33345* #
A-8314 ..... N80-33777* #
A-8369 ..... N80-34097* #
A-8382 ..... N80-33493* #

AA-R-7914-4702 ..... N80-34206 #

ACBU-SER-II-71 ..... N80-34331 #

ACI-070380-F ..... N80-34327* #

AD-A074392 ..... N80-34339 #
AD-A080209 ..... N80-34001 #
AD-A080447 ..... N80-34202 #
AD-A080463 ..... N80-34189 #
AD-A080614 ..... N80-33906 #
AD-A080615 ..... N80-33905 #
AD-A083653 ..... N80-33750 #
AD-A084750 ..... N80-33663 #
AD-A086066 ..... N80-34160 #
AD-A086465 ..... N80-34192 #
AD-A086527 ..... N80-33684 #
AD-A087518 ..... N80-33848 #
AD-A087525 ..... N80-34331 #
AD-A087803 ..... N80-34329 #
AD-A087804 ..... N80-34330 #
AD-A087840 ..... N80-34100 #
AD-A088160 ..... N80-33362 #
AD-A088351 ..... N80-33400 #
AD-A088364 ..... N80-33685 #
AD-A088545 ..... N80-33666 #
AD-A088548 ..... N80-34278 #
AD-A088549 ..... N80-34033 #
AD-A088562 ..... N80-33621 #
AD-A088563 ..... N80-34034 #
AD-A088564 ..... N80-33563 #
AD-A088565 ..... N80-33557 #
AD-A088566 ..... N80-33521 #
AD-A088567 ..... N80-34271 #
AD-A088570 ..... N80-34190 #
AD-A088571 ..... N80-33498 #
AD-A088573 ..... N80-33573 #
AD-A088576 ..... N80-34032 #
AD-A088577 ..... N80-33967 #
AD-A088578 ..... N80-34261 #
AD-A088581 ..... N80-33477 #
AD-A088591 ..... N80-33695 #
AD-A088592 ..... N80-33665 #
AD-A088594 ..... N80-33908 #
AD-A088597 ..... N80-33608 #
AD-A088600 ..... N80-34255 #
AD-A088629 ..... N80-33402 #
AD-A088655 ..... N80-33736 #
AD-A088657 ..... N80-33799 #
AD-A088658 ..... N80-33756
AD-A088660 ..... N80-33907 #
AD-A088661 ..... N80-34204 #
AD-A088662 ..... N80-33260 #
AD-A088663 ..... N80-34165 #
AD-A088664 ..... N80-33661 #
AD-A088666 ..... N80-33522 #
AD-A088667 ..... N80-33561 #
AD-A088668 ..... N80-34277 #
AD-A088669 ..... N80-34253 #
AD-A088673 ..... N80-33660 #
AD-A088700 ..... N80-33689 #
AD-A088704 ..... N80-33598 #
AD-A088706 ..... N80-33414 #
AD-A088708 ..... N80-33650 #
AD-A088723 ..... N80-34155 #
AD-A088725 ..... N80-33419 #
AD-A088726 ..... N80-34094 #
AD-A088732 ..... N80-33502 #
AD-A088733 ..... N80-33500 #
AD-A088734 ..... N80-34007 #
AD-A088736 ..... N80-34269 #
AD-A088739 ..... N80-33662 #
AD-A088741 ..... N80-33499 #
AD-A088745 ..... N80-33688 #
AD-A088746 ..... N80-34270 #
AD-A088747 ..... N80-34191 #
AD-A088748 ..... N80-34234 #
AD-A088750 ..... N80-33720 #
AD-A088752 ..... N80-34238 #
AD-A088756 ..... N80-33804 #
AD-A088757 ..... N80-33659 #
AD-A088760 ..... N80-34154 #
AD-A088762 ..... N80-34276 #
AD-A088763 ..... N80-34153 #
AD-A088765 ..... N80-33754 #
AD-A088767 ..... N80-34159 #
AD-A088768 ..... N80-33657 #
AD-A088769 ..... N80-33686 #
AD-A088770 ..... N80-33562 #
AD-A088771 ..... N80-33658 #
AD-A088772 ..... N80-33687 #
AD-A088773 ..... N80-33968 #
AD-A088774 ..... N80-33343 #
AD-A088790 ..... N80-34035 #
AD-A088792 ..... N80-33559 #
AD-A088804 ..... N80-33461 #
AD-A088806 ..... N80-33655 #
AD-A088807 ..... N80-33723 #
AD-A088831 ..... N80-33359 #
AD-A088833 ..... N80-33401* #
AD-A088836 ..... N80-33737 #
AD-A088838 ..... N80-33800 #
AD-A088840 ..... N80-34051 #
AD-A088842 ..... N80-33654 #
AD-A088847 ..... N80-34252 #
AD-A088848 ..... N80-33652 #
AD-A088852 ..... N80-33387 #
AD-A088853 ..... N80-33651 #
AD-A088854 ..... N80-34156 #
AD-A088855 ..... N80-33421 #
AD-A088856 ..... N80-34267 #
AD-A088857 ..... N80-34220 #
AD-A088879 ..... N80-34005 #
AD-A088880 ..... N80-34002 #
AD-A088881 ..... N80-34037 #
AD-A088882 ..... N80-34003 #
AD-A088883 ..... N80-33574 #
AD-A088884 ..... N80-34152 #
AD-A088885 ..... N80-33653 #
AD-A088889 ..... N80-34006 #
AD-A088892 ..... N80-34036 #
AD-A088894 ..... N80-33724 #
AD-A088897 ..... N80-33503 #
AD-A088898 ..... N80-33411 #
AD-A088902 ..... N80-34193 #
AD-A088903 ..... N80-33600 #
AD-A088904 ..... N80-33596 #
AD-A088908 ..... N80-33423 #
AD-A088910 ..... N80-34206 #
AD-A088911 ..... N80-33725 #
AD-A088914 ..... N80-33664 #
AD-A088915 ..... N80-34004 #
AD-A088917 ..... N80-33403 #
AD-A088923 ..... N80-33690 #
AD-A088927 ..... N80-33412 #
AD-A088936 ..... N80-33656 #
AD-A088938 ..... N80-33361 #
AD-A088939 ..... N80-33691 #
AD-A089006 ..... N80-33480 #
AD-A089008 ..... N80-33422 #
AD-A089022 ..... N80-34050 #
AD-A089023 ..... N80-33572 #
AD-A089025 ..... N80-33458 #
AD-A089026 ..... N80-34268 #
AD-A089045 ..... N80-33405 #
AD-A089047 ..... N80-34237 #
AD-A089053 ..... N80-33388 #
AD-A089055 ..... N80-33567 #
AD-A089058 ..... N80-34296 #
AD-A089059 ..... N80-34297 #
AD-A089060 ..... N80-33458 #
AD-A089081 ..... N80-33847 #
AD-A089083 ..... N80-33693 #
AD-A089086 ..... N80-34221 #
AD-A089087 ..... N80-33413 #
AD-A089089 ..... N80-34207 #
AD-A089070 ..... N80-34282 #
AD-A089075 ..... N80-33420 #
AD-A089097 ..... N80-33692 #
AD-A089099 ..... N80-33722 #
AD-A089100 ..... N80-33965 #
AD-A089101 ..... N80-33599 #
AD-A089102 ..... N80-33501 #
AD-A089104 ..... N80-33385 #
AD-A089105 ..... N80-33806 #
AD-A089107 ..... N80-33558 #
AD-A089108 ..... N80-34203 #
AD-A089109 ..... N80-34031 #
AD-A089110 ..... N80-33807 #
AD-A089111 ..... N80-33966 #
AD-A089116 ..... N80-33805 #
AD-A089117 ..... N80-34205 #
AD-A089118 ..... N80-33803 #
AD-A089119 ..... N80-33802 #
AD-A089121 ..... N80-33729 #
AD-A089129 ..... N80-34235 #
AD-A089130 ..... N80-33738 #
AD-A089133 ..... N80-34008 #
AD-A089134 ..... N80-33739 #
AD-A089135 ..... N80-33694 #
AD-A089137 ..... N80-33801 #
AD-A089138 ..... N80-34105 #
AD-A089142 ..... N80-33461 #
AD-A089143 ..... N80-34254 #
AD-A089145 ..... N80-33560 #
AD-A089147 ..... N80-33417 #
AD-A089148 ..... N80-34030 #
AD-A089150 ..... N80-34029 #

AD-E300878 ..... N80-33685 #
AD-E300890 ..... N80-33664 #
AD-E300892 ..... N80-33725 #
AD-E300896 ..... N80-34206 #
AD-E300897 ..... N80-34004 #
AD-E440085 ..... N80-34193 #
AD-E595021 ..... N80-33477 #

AEC-300-80-004 ..... N80-33973 #

AEDC-TR-80-21 ..... N80-33414 #

AFAMRL-TR-80-39 ..... N80-34100 #

AFAPL-TR-79-2121 ..... N80-33750 #

AFESC/ESL-TR-80-15 ..... N80-33420 #

AFFDL-TR-79-3158 ..... N80-34196 #

AFGL-AFSG-425 ..... N80-34003 #

AFGL-ERP-709 ..... N80-34005 #

AFGL-IP-286 ..... N80-34007 #
AFGL-IP-287 ..... N80-34002 #

AFGL-TR-80-0010 ..... N80-34001 #
AFGL-TR-80-0087 ..... N80-34037 #
AFGL-TR-80-0123 ..... N80-34331 #
AFGL-TR-80-0150 ..... N80-34002 #
AFGL-TR-80-0151 ..... N80-34003 #
AFGL-TR-80-0152 ..... N80-34005 #

AFHRL-TR-79-57 ..... N80-33421 #
AFHRL-TR-79-65 ..... N80-33405 #

AFIT-CT-80-19T ..... N80-33867 #

AFIT-LSSR-37-80 ..... N80-33343 #
AFIT-LSSR-39-80 ..... N80-34155 #
AFIT-LSSR-46-80 ..... N80-33419 #

AFML-TR-79-4190-PT-1 ..... N80-33573 #

AFOSR-80-0092TR ..... N80-33688 #
AFOSR-80-0458TR ..... N80-34192 #
AFOSR-80-0609TR ..... N80-33481 #
AFOSR-80-0624TR ..... N80-34255 #
AFOSR-80-0681TR ..... N80-33805 #
AFOSR-80-0682TR ..... N80-34270 #
AFOSR-80-0683TR ..... N80-34234 #
AFOSR-80-0684TR ..... N80-33804 #
AFOSR-80-0685TR ..... N80-33802 #
AFOSR-80-0686TR ..... N80-33803 #
AFOSR-80-0687TR ..... N80-33723 #
AFOSR-80-0688TR ..... N80-34205 #
AFOSR-80-0689TR ..... N80-34191 #
AFOSR-80-0690TR ..... N80-33862 #
AFOSR-80-0694TR ..... N80-33350 #
AFOSR-80-0696TR ..... N80-34236 #
AFOSR-80-0699TR ..... N80-34220 #
AFOSR-80-0708TR ..... N80-34267 #

AFWAL-TR-80-1034 ..... N80-34254 #
AFWAL-TR-80-2011 ..... N80-33413 #
AFWAL-TR-80-2012 ..... N80-33599 #
AFWAL-TR-80-2034 ..... N80-33411 #
AFWAL-TR-80-2050 ..... N80-33908 #
AFWAL-TR-80-3012 ..... N80-33499 #
AFWAL-TR-80-3045 ..... N80-33801 #
AFWAL-TR-80-3067 ..... N80-33402 #
AFWAL-TR-80-4005 ..... N80-33561 #
AFWAL-TR-80-4028 ..... N80-33558 #
AFWAL-TR-80-4031 ..... N80-33502 #
AFWAL-TR-80-4060 ..... N80-33501 #

AGARD-AG-160-VOL-10 ..... N80-33406 #
AGARD-AG-160-VOL-11 ..... N80-33407 #
AGARD-AG-235-VOL-2 ..... N80-34290 #

AGARD-R-679 ..... N80-33363 #

AGNS-35800-CONF-65 ..... N80-33730 #

ALO-4123-5 ..... N80-33913 #

AMMRC-TR-80-36 ..... N80-33728 #

APR-2 ..... N80-33523 #

AR-001-505 ..... N80-34050 #
AR-001-607 ..... N80-33305 #
AR-001-662 ..... N80-33572 #
AR-001-729 ..... N80-33721 #
AR-001-742 ..... N80-33360 #
AR-001-748 ..... N80-33781 #
AR-001-756 ..... N80-33796 #
AR-001-768 ..... N80-33797 #

ARB-R-79/116 ..... N80-33977

ARL-AERO-REPT-152 ..... N80-33396 #

ARL-STRUC-NOTE-454 ..... N80-33781 #

ARL/MAT-REPT-112 ..... N80-33796 #

ARL/MECH-ENG-NOTE-375 ..... N80-33721 #

ARL/PSU-TM-80-94 ..... N80-33722 #
ARL/PSU-TM-80-139 ..... N80-34221 #

ARL/STRUC-NOTE-455 ..... N80-33797 #

ARL/STRUC-REPT-376 ..... N80-33798 #
ARL/STRUC-REPT-378 ..... N80-33399 #

ARL/STRUC-TM-293 ..... N80-34339 #

ARLCB-TR-80019 ..... N80-34193 #

ARLCD-CR-79013 ..... N80-33600 #

ARO-14084.13-MS ..... N80-33498 #
ARO-14350.7-MS ..... N80-33563 #
ARO-15421.2-GS ..... N80-34034 #
ARO-16771.3-C ..... N80-34271 #

ATR-1 ..... N80-33417 #
ATR-80(7783)-1 ..... N80-33523 #

AVRADCOM-TM-80-B-2 ..... N80-33349* #

AVRADCOM-TR-80-A-10 ..... N80-33777* #
AVRADCOM-TR-80-A-11 ..... N80-33349* #
AVRADCOM-TR-80-09 ..... N80-33410* #

BA-80-31 ..... N80-34322* #

BBC-RD-1980/9 ..... N80-33838

BBN-4016 ..... N80-33382* #
BBN-4474 ..... N80-33456 #

BHT-699-099-006 ..... N80-33422 #
BHT-699-099-122 ..... N80-33403 #

BLL-PO-TRANS-3749-(7737.470) N80-33989

BLL-RDL-TRANS-3665-(7737.470) N80-33643
BLL-RDL-TRANS-3765-(7737.470) N80-33624
BLL-RDL-TRANS-3768-(7737.470) N80-33623
BLL-RDL-TRANS-3798-(7737.470) N80-33622

BLL-RTS-11700 ..... N80-34167
BLL-RTS-11870 ..... N80-33527
BLL-RTS-11916 ..... N80-33544
BLL-RTS-11960 ..... N80-33506
BLL-RTS-11980 ..... N80-33528
BLL-RTS-11997 ..... N80-33530
BLL-RTS-12025 ..... N80-33525
BLL-RTS-12046 ..... N80-34084
BLL-RTS-12070 ..... N80-33758
BLL-RTS-12078 ..... N80-33743
BLL-RTS-12141 ..... N80-33505
BLL-RTS-12152 ..... N80-33526
BLL-RTS-12156 ..... N80-33532
BLL-RTS-12157 ..... N80-33504
BLL-RTS-12170 ..... N80-34243
BLL-RTS-12196 ..... N80-33529
BLL-RTS-12200 ..... N80-34262
BLL-RTS-12203 ..... N80-33524
BLL-RTS-12204 ..... N80-33538
BLL-RTS-12262 ..... N80-33533
BLL-RTS-12263 ..... N80-33671
BLL-RTS-12265 ..... N80-33537
BLL-RTS-12266 ..... N80-33672
BLL-RTS-12267 ..... N80-33534
BLL-RTS-12289 ..... N80-33543
BLL-RTS-12290 ..... N80-34168
BLL-RTS-12292 ..... N80-33535
BLL-RTS-12304 ..... N80-33536
BLL-RTS-12307 ..... N80-33608
BLL-RTS-12332 ..... N80-33626
BLL-RTS-12344 ..... N80-33540
BLL-RTS-12346 ..... N80-33576
BLL-RTS-12347 ..... N80-33575
BLL-RTS-12350 ..... N80-34055
BLL-RTS-12359 ..... N80-33539
BLL-RTS-12381 ..... N80-34054
BLL-RTS-12400 ..... N80-33742

BLL-TRANS-T4943/BG/ERS/79 ..... N80-33541

BLL-TRANS-1448 ..... N80-34135
BLL-TRANS-1451-(9022.549) N80-34028
BLL-TRANS-1453-(9022.549) N80-34013
BLL-TRANS-1455-(9022.549) N80-34014
BLL-TRANS-3663 ..... N80-33625
BLL-TRANS-3756-(7737.470) N80-33670
BLL-TRANS-3784 ..... N80-33637
BLL-TRANS-4253-(9091.9F) N80-33531

BLL-T4934/BG/ERS/79(9022.049) N80-33542

BMN-53 ..... N80-34202 #

CAEC-49 ..... N80-33606 #
CAEC-50 ..... N80-33920 #
CAEC-57 ..... N80-33973 #
CAEC-59 ..... N80-33972 #
CAEC-66 ..... N80-33921 #
CAEC-300-80-003 ..... N80-33972 #
CAEC-300-80-025 ..... N80-33920 #
CAEC-500-80-017 ..... N80-33921 #

CAI-7323-0180-5 ..... N80-34254 #

CALSPAN-AB-5866-A-4 ..... N80-33359 #

CARL-IM-80-04 ..... N80-33714* #

CCVS74-VSR600 ..... N80-34134 #

CEL-TM-116.013376-9-M ..... N80-33659 #

CEM-4232-667 ..... N80-33965 #

CONF-800140-1 ..... N80-33740 #
CONF-800540-2 ..... N80-33867 #
CONF-800640-12 ..... N80-34239 #
CONF-800855-19 ..... N80-33730 #
CONF-800707-14 ..... N80-33741 #
CONF-800713-6 ..... N80-33603 #
CONF-800713-8 ..... N80-33804 #

CONS-5085-T2 ..... N80-33909 #

COO-3084-79 ..... N80-33565 #

CRC-TN-704-E ..... N80-33649 #

CRC-1318-E ..... N80-33648 #

CSIR-CENG-294 ..... N80-33579 #

CSIR-ME-1838 ..... N80-33868 #

CSIR-NMST-79-60 ..... N80-33352 #

CSIR-RR-359 ..... N80-33962 #

CSIR-SEA-8001 ..... N80-34049 #

CSIR-SR-FIS-201 ..... N80-33837 #

CSIR-TWISK-102 ..... N80-34286 #
CSIR-TWISK-117 ..... N80-34179 #
CSIR-TWISK-126 ..... N80-34180 #
CSIR-TWISK-127 ..... N80-34181 #
CSIR-TWISK-128 ..... N80-34281 #
CSIR-TWISK-130 ..... N80-34196 #
CSIR-TWISK-131 ..... N80-34147 #
CSIR-TWISK-132 ..... N80-34211 #
CSIR-TWISK-133 ..... N80-34201 #
CSIR-TWISK-134 ..... N80-34182 #
CSIR-TWISK-135 ..... N80-34162 #
CSIR-TWISK-136 ..... N80-34183 #
CSIR-TWISK-137 ..... N80-34212 #

DFR-1472-FAA ..... N80-33967 #

DFVLR-MITT-78-02 ..... N80-34112 #
DFVLR-MITT-78-02 ..... N80-34113 #
DFVLR-MITT-78-02 ..... N80-34114 #
DFVLR-MITT-78-02 ..... N80-34115 #
DFVLR-MITT-78-02 ..... N80-34116 #
DFVLR-MITT-78-02 ..... N80-34117 #
DFVLR-MITT-78-02 ..... N80-34118 #
DFVLR-MITT-78-02 ..... N80-34119 #
DFVLR-MITT-78-02 ..... N80-34120 #
DFVLR-MITT-78-02 ..... N80-34121 #

DFVLR-MITT-78-02 ..... N80-34122 #
DFVLR-MITT-78-02 ..... N80-34123 #
DFVLR-MITT-78-02 ..... N80-34124 #
DFVLR-MITT-78-02 ..... N80-34125 #

DNA-4843F ..... N80-34206 #
DNA-5006F ..... N80-33685 #
DNA-5191T ..... N80-33725 #
DNA-5239F ..... N80-34004 #
DNA-5265F ..... N80-33684 #

DOE/ER-01388/443 ..... N80-33667 #
DOE/ER-10556/1 ..... N80-33565 #

DOE/ET-15445/T1 ..... N80-33912 #
DOE/ET-23108/1 ..... N80-33914 #

DOE/NASA/0031-80/4-VOL-4 ..... N80-33859* #
DOE/NASA/0031-80/6 ..... N80-33860* #
DOE/NASA/0031-80/6-VOL-6-PT-2 ..... N80-33861* #
DOE/NASA/0134-1 ..... N80-33862* #
DOE/NASA/2593-18 ..... N80-33556* #

DOE/PC-20041/T1 ..... N80-33520 #

DOE/PE-70048/T2 ..... N80-33602 #

DOT-HS-805240 ..... N80-33752 #

DOT-TSC-NHTSA-79-41 ..... N80-33752 #
DOT-TSC-NHTSA-79-55 ..... N80-33751 #

DOT-TSC-1046 ..... N80-33751 #

DREO-TN-79-30 ..... N80-33906 #
DREO-TN-79-31 ..... N80-33905 #

DTNSRDC/ASED-80/13-VOL-3 ..... N80-33361 #

DTNSRDC/CMLD-80/10 ..... N80-33684 #

DTNSRDC/SME-80/23 ..... N80-33807 #

D6-48727 ..... N80-34219* #
D8-0375-VOL-6-REV-3 ..... N80-33401* #
D180-26163-1 ..... N80-33489* #

E-224 ..... N80-33555* #
E-299 ..... N80-33749* #
E-391 ..... N80-33410* #
E-469 ..... N80-33485* #
E-474 ..... N80-33557* #
E-532 ..... N80-33558* #

EPA-450/4-80-007 ..... N80-34289 #
EPA-600/2-80-164 ..... N80-34287 #
EPA-600/2-80-166 ..... N80-33974 #
EPA-600/2-80-167 ..... N80-33978
EPA-600/4-80-019 ..... N80-33949 #
EPA-600/7-80-051 ..... N80-33980 #
EPA-600/7-80-092 ..... N80-33981 #
EPA-600/8-80-011 ..... N80-34288 #
EPA-600/8-80-017 ..... N80-33970 #

EPRI-AP-1390 ..... N80-33601 #

EPRI-EA-1434 ..... N80-33731 #

EQL-14 ..... N80-33971 #

ERADCOM/ASL-TR-0083 ..... N80-33654 #

ERIM-139600-3-X(I) N80-34241

ERL-0075-TR ..... N80-33572 #

ESA-BR-04-PT-1 ..... N80-33668 #

ESA-SP-147 ..... N80-33873 #

ESA-TT-587 ..... N80-34112 #
ESA-TT-651 ..... N80-33613 #

ESD-TR-80-27 ..... N80-33665 #
ESD-TR-80-69 ..... N80-33736 #
ESD-TR-80-70 ..... N80-23661 #

ESL-TM-1083 ..... N80-33685 #

ESL-711353-1 ..... N80-33655 #

ETL-0221 ..... N80-33848 #
ETL-0236 ..... N80-33653 #

E80-10228 ..... N80-33829* #
E80-10311 ..... N80-33830* #
E80-10315 ..... N80-33831* #
E80-10321 ..... N80-33832* #
E80-10334 ..... N80-33833* #
E80-10335 ..... N80-33834* #
E80-10336 ..... N80-33835* #

FAA-AEE-80-22 ..... N80-33362 #

FAA-CT-80-15 ..... N80-34105 #
FAA-CT-80-25 ..... N80-33388 #

FAA-EE-80-16 ..... N80-33965 #
FAA-EE-80-20 ..... N80-34006 #
FAA-EE-80-25 ..... N80-33966 #
FAA-EE-80-27 ..... N80-33412 #

FAA-NA-79-34 ..... N80-33387 #

FAA-RD-80-24-REV ..... N80-34036 #
FAA-RD-80-49 ..... N80-33387 #
FAA-RD-80-56 ..... N80-34105 #
FAA-RD-80-76 ..... N80-34091 #

FAA-RO-80-74 ..... N80-33388 #

FCM-80-3 ..... N80-34041 #

FHWA-WA-80-38.1 ..... N80-33976 #

FJSRL-TR-80-0001 ..... N80-33429 #

FR-2 ..... N80-33735* #

FSRP-NE-462 ..... N80-33852 #

GARP-PUBL-23 ..... N80-33811 #

GDC-MAP-80-001 ..... N80-33498* #

GE80ET0103-VOL-4 ..... N80-33858* #
GE80ET0105-VOL-6-PT-1 ..... N80-33860* #
GE80ET0105-VOL-6-PT-2 ..... N80-33861* #

GL-3131 ..... N80-33688 #

GLERL-CONTRIB-292 ..... N80-34040 #

GLERL-15 ..... N80-34040 #

GPO-45-04R ..... N80-34294 #
GPO-48-402 ..... N80-33963 #
GPO-50-084 ..... N80-33964 #
GPO-50-313 ..... N80-33580 #
GPO-51-382 ..... N80-33872 #
GPO-51-721 ..... N80-33581 #
GPO-52-581 ..... N80-34295 #
GPO-54-572 ..... N80-33383 #
GPO-55-834 ..... N80-33871 #
GPO-56-541 ..... N80-33870 #

GSTR-79-4 ..... N80-33936* #

H-1135 ..... N80-33350* #

HDL-SR-80-4 ..... N80-33692 #

HDL-TR-1924 ..... N80-33724 #

HEL-TN-8-80 ..... N80-33691 #

HL-80-6 ..... N80-33720 #

HONEYWELL-41696 ..... N80-34269 #

HUMRRO-FR-MTD(CA)-80-13 ..... N80-33381* #

IAEA-CN-38/I-3 ..... N80-33741 #

ICAF-1160 ..... N80-33779 #
ICAF-1161 ..... N80-33780 #

IITRI-J6379 ..... N80-33600 #

IN-76-FM-38 ..... N80-34146* #
IN-79-FM-10-REV-2 ..... N80-33457* #

IN-80-FM-48 ..... N80-34146* #

INPE-1739-RPE/139 ..... N80-34027 #
INPE-1743-RPE/139 ..... N80-33459 #
INPE-1753-RPE/144 ..... N80-34184 #
INPE-1760-RPE/149 ..... N80-33644 #
INPE-1767-TDL/026 ..... N80-33639 #
INPE-1768-RPE/154 ..... N80-33640 #
INPE-1769-RPE/155 ..... N80-34026 #
INPE-1786-RPE/158 ..... N80-34025 #
INPE-1795-NTE/161 ..... N80-33648 #
INPE-1805-RPE/173 ..... N80-34323 #
INPE-1807-RPE/175 ..... N80-34306 #
INPE-1808-RPE/176 ..... N80-34337 #
INPE-1814-RPE/182 ..... N80-33681 #
INPE-1815-RPE/183 ..... N80-34185 #
INPE-1816-RPE/184 ..... N80-33682 #
INPE-1817-RPE/185 ..... N80-33680 #
INPE-1820-RPE/186 ..... N80-33647 #
INPE-1823-RPE/189 ..... N80-33843 #
INPE-1830-RPE/194 ..... N80-33645 #
INPE-1831-RPE/195 ..... N80-33838 #
INPE-1834-RPE/196 ..... N80-34184 #
INPE-1838-RPE/199 ..... N80-33842 #
INPE-1839-RPE/200 ..... N80-34024 #
INPE-1841-RPE/201 ..... N80-33844 #
INPE-1843-RPE/203 ..... N80-33994 #
INPE-1850-RPE/207 ..... N80-34210 #
INPE-1851-RPE/208 ..... N80-33995 #
INPE-1855-RPE/209 ..... N80-34187 #
INPE-1859-RPE/210 ..... N80-33841 #

IR-2 ..... N80-34001 #
IR-21 ..... N80-33495* #

IRIG-STANDARD-103-80 ..... N80-33668 #

IRL-1213 ..... N80-34057* #

IRT-8173-009 ..... N80-34234 #

ISBN-0-4988-1766-6 ..... N80-34183 #
ISBN-0-7988-1487-5 ..... N80-33968 #
ISBN-0-7988-1562-0 ..... N80-33962 #
ISBN-0-7988-1567-1 ..... N80-34049 #
ISBN-0-7988-1649-X ..... N80-33961 #
ISBN-0-7988-1656-2 ..... N80-33837 #
ISBN-0-7988-1665-1 ..... N80-33936 #
ISBN-0-7988-1665-1 ..... N80-33943 #
ISBN-0-7988-1667-8 ..... N80-33943 #
ISBN-0-7988-1668-6 ..... N80-33928 #
ISBN-0-7988-1725-9 ..... N80-33729 #
ISBN-0-7988-1730-5 ..... N80-33579 #
ISBN-0-7989-10651 ..... N80-33929 #
ISBN-92-835-1331-2 ..... N80-34290 #
ISBN-92-835-1364-9 ..... N80-33363 #
ISBN-92-835-1368-1 ..... N80-33407 #

ISD-193 ..... N80-33757
ISD-78003-80-R-1 ..... N80-34153 #

ISSN-0143-7143 ..... N80-33925
ISSN-0250-1589 ..... N80-33668 #
ISSN-0436-1199 ..... N80-33562 #

ISSUE-1 ..... N80-33337

IZF-1978-10 ..... N80-34242

JHU/APL/EQR/80-1 ..... N80-33919 #

JPL-PR-42-59 ..... N80-33427* #

JPL-PUB-79-97 ..... N80-34022* #
JPL-PUB-80-20 ..... N80-33454* #
JPL-PUB-80-52 ..... N80-33641* #
JPL-PUB-80-56 ..... N80-33494* #
JPL-PUB-80-58 ..... N80-33448* #
JPL-PUB-80-71 ..... N80-33640* #
JPL-PUB-80-72 ..... N80-34093* #
JPL-PUB-80-75 ..... N80-33639* #
JPL-PUB-80-78 ..... N80-34296* #
JPL-PUB-80-80 ..... N80-34320* #

JPL-400-24 ..... N80-34318* #

JPRS-76415 ..... N80-34058 #

JRI-NCA-OR625-001 ..... N80-33642* #

JSC-11318 ..... N80-34146* #
JSC-14713 ..... N80-33457* #
JSC-16335 ..... N80-33932* #
JSC-16782 ..... N80-34146* #

KMSF-U-953 ..... N80-33741 #

KSC-GP-15-12 ..... N80-33432* #
KSC-GP-15-13 ..... N80-33455* #

KTH-AERO-TN-60 ..... N80-33353* #

KU-FRL-417-14 ..... N80-34215* #

L-13130 ..... N80-33416* #
L-13548 ..... N80-33364* #
L-13600 ..... N80-33409* #
L-13746 ..... N80-33719* #
L-13769 ..... N80-33358* #
L-13848 ..... N80-33418* #
L-13877 ..... N80-33996* #
L-13993 ..... N80-33463* #
L-14019 ..... N80-33683* #

LA-8385-T ..... N80-33726 #
LA-8398-MS ..... N80-33969 #
LA-8411-PR ..... N80-33755 #

LARS-TR-070980 ..... N80-33830* #

LC-80-600010 ..... N80-34272 #
LC-80-600092 ..... N80-33922 #

LEMSCO-14310 ..... N80-33832* #

LG80ER-1 ..... N80-33394* #

LIDS-P-1013 ..... N80-34159 #

LMSC-D678214 ..... N80-33808 #
LMSC-D678888-PT-2 ..... N80-33354* #

LR-297 ..... N80-33779 #
LR-29338 ..... N80-33487* #

LTP-41 ..... N80-33736 #

M-368 ..... N80-33780 #

MAE-1425 ..... N80-33417 #

MCR-80-509-ISSUE-4 ..... N80-33479* #

MERADCOM-2300 ..... N80-34298 #
MERADCOM-2304 ..... N80-34297 #

MLM-2706(OP) ..... N80-33603 #
MLM-2710(OP) ..... N80-33604 #

MPIS-23/1979 ..... N80-33582 #

MSRR-462 ..... N80-34154 #

MSSU-EIRS-ASE-80-4 ..... N80-34178* #

NADC-78155-80 ..... N80-33400 #
NADC-80079-60 ..... N80-33503 #

NASA-CASE-LEW-11900-3 ..... N80-33482*
NASA-CASE-LEW-12918-1 ..... N80-33857* #

NASA-CASE-MFS-25312-1 ..... N80-34251* #

NASA-CASE-NPO-15036-1 ..... N80-34250* #
NASA-CASE-NPO-15088-1 ..... N80-33679* #

NASA-CP-2151 ..... N80-33782* #
NASA-CP-2154 ..... N80-33465* #

NASA-CR-3200 ..... N80-33355* #
NASA-CR-3264 ..... N80-33354* #
NASA-CR-3300 ..... N80-34098* #
NASA-CR-3312 ..... N80-33396* #
NASA-CR-3313 ..... N80-34188* #
NASA-CR-3319 ..... N80-33869* #
NASA-CR-3330 ..... N80-33718* #
NASA-CR-3341 ..... N80-33735* #
NASA-CR-152364 ..... N80-33396* #
NASA-CR-152366 ..... N80-33351* #
NASA-CR-152368 ..... N80-33397* #
NASA-CR-152369 ..... N80-33381* #
NASA-CR-158951 ..... N80-33382* #
NASA-CR-158201 ..... N80-33487* #
NASA-CR-158212 ..... N80-33488* #
NASA-CR-158214 ..... N80-33490* #
NASA-CR-158215 ..... N80-33492* #
NASA-CR-158253 ..... N80-33394* #
NASA-CR-158267 ..... N80-33496* #
NASA-CR-158290 ..... N80-33382* #
NASA-CR-158317 ..... N80-33497* #
NASA-CR-158333 ..... N80-34219* #
NASA-CR-158339 ..... N80-34217* #
NASA-CR-158359 ..... N80-34216* #
NASA-CR-159885 ..... N80-33408* #
NASA-CR-159768 ..... N80-33859* #
NASA-CR-159770-PT-1 ..... N80-33860* #
NASA-CR-159770-PT-2 ..... N80-33861* #
NASA-CR-159817 ..... N80-33478* #
NASA-CR-160023 ..... N80-33450* #
NASA-CR-160024 ..... N80-33451* #
NASA-CR-160737 ..... N80-33832* #
NASA-CR-161202 ..... N80-33865* #
NASA-CR-161203 ..... N80-33864* #
NASA-CR-161549 ..... N80-33858* #
NASA-CR-161558 ..... N80-33867* #
NASA-CR-161562 ..... N80-33866* #
NASA-CR-161579 ..... N80-34327* #
NASA-CR-161580 ..... N80-33892* #
NASA-CR-161581 ..... N80-34111* #
NASA-CR-161584 ..... N80-33748* #
NASA-CR-161585 ..... N80-33479* #
NASA-CR-163098 ..... N80-33350* #
NASA-CR-163265 ..... N80-34093* #
NASA-CR-163379 ..... N80-33830* #
NASA-CR-163403 ..... N80-33831* #
NASA-CR-163412 ..... N80-33833* #
NASA-CR-163444 ..... N80-33835* #
NASA-CR-163541 ..... N80-33834* #
NASA-CR-163543 ..... N80-33829* #
NASA-CR-163587 ..... N80-34101* #
NASA-CR-163599 ..... N80-34103* #
NASA-CR-163600 ..... N80-34104* #
NASA-CR-163601 ..... N80-34178* #
NASA-CR-163602 ..... N80-34322* #
NASA-CR-163603 ..... N80-34321* #
NASA-CR-163604 ..... N80-33642* #
NASA-CR-163605 ..... N80-34057* #
NASA-CR-163606 ..... N80-33926* #
NASA-CR-163607 ..... N80-34318* #
NASA-CR-163608 ..... N80-33427* #
NASA-CR-163609 ..... N80-33991* #
NASA-CR-163610 ..... N80-33996* #
NASA-CR-163611 ..... N80-34326* #
NASA-CR-163612 ..... N80-33449* #
NASA-CR-163613 ..... N80-33747* #
NASA-CR-163615 ..... N80-33415* #
NASA-CR-163616 ..... N80-33714* #
NASA-CR-163617 ..... N80-34319* #
NASA-CR-163618 ..... N80-33495* #
NASA-CR-163619 ..... N80-34307* #
NASA-CR-163620 ..... N80-33993* #
NASA-CR-163621 ..... N80-33717 #
NASA-CR-163622 ..... N80-33462* #
NASA-CR-163623 ..... N80-33612* #
NASA-CR-163624 ..... N80-34215* #
NASA-CR-163626 ..... N80-34022* #
NASA-CR-163627 ..... N80-33448* #
NASA-CR-163628 ..... N80-33639* #
NASA-CR-163629 ..... N80-33640* #
NASA-CR-163630 ..... N80-34320* #
NASA-CR-163631 ..... N80-33494* #
NASA-CR-163632 ..... N80-33641* #
NASA-CR-163633 ..... N80-34296* #
NASA-CR-163635 ..... N80-33454* #
NASA-CR-163636 ..... N80-34328* #
NASA-CR-163637 ..... N80-33330 #
NASA-CR-163639 ..... N80-33401* #
NASA-CR-163640 ..... N80-33979* #
NASA-CR-163698 ..... N80-34102* #
NASA-CR-165146 ..... N80-33489* #
NASA-CR-165156 ..... N80-33862* #
NASA-CR-165164 ..... N80-33476* #

NASA-NEWS-RELEASE-80-158 ..... N80-33424*
NASA-NEWS-RELEASE-80-159 ..... N80-34324*

NASA-SP-7011(210) N80-34088*
NASA-SP-7037(125) N80-33336*
NASA-SP-7039(17)-SECTION-2 ..... N80-34264*

NASA-TM-8221 ..... N80-33457* #
NASA-TM-75862 ..... N80-33346* #
NASA-TM-76369 ..... N80-33453* #
NASA-TM-76373 ..... N80-33425* #
NASA-TM-78304 ..... N80-34209* #
NASA-TM-78305 ..... N80-33863* #
NASA-TM-80190 ..... N80-33347* #
NASA-TM-80206 ..... N80-33384* #
NASA-TM-80219 ..... N80-33491* #
NASA-TM-81121 ..... N80-33997* #
NASA-TM-81181 ..... N80-34056* #
NASA-TM-81213 ..... N80-33349* #
NASA-TM-81221 ..... N80-33345* #
NASA-TM-81226 ..... N80-33777* #
NASA-TM-81245 ..... N80-34097* #
NASA-TM-81246 ..... N80-33493* #
NASA-TM-81567 ..... N80-33558* #
NASA-TM-81838 ..... N80-33416* #
NASA-TM-81831 ..... N80-33928* #
NASA-TM-81843 ..... N80-33827* #
NASA-TM-81844 ..... N80-33358* #
NASA-TM-81849 ..... N80-34218* #
NASA-TM-81869 ..... N80-33419* #
NASA-TM-81871 ..... N80-33348* #
NASA-TM-81872 ..... N80-33342* #
NASA-TM-81875 ..... N80-34096* #
NASA-TM-81877 ..... N80-33716* #
NASA-TM-81880 ..... N80-33715* #
NASA-TM-81881 ..... N80-34048* #
NASA-TM-81883 ..... N80-33570* #
NASA-TM-81884 ..... N80-33571* #
NASA-TM-81889 ..... N80-33393* #
NASA-TM-81890 ..... N80-33778* #
NASA-TM-81891 ..... N80-33480* #
NASA-TM-82180 ..... N80-34301* #
NASA-TM-82182 ..... N80-34106* #
NASA-TM-82206 ..... N80-33845* #
NASA-TM-82207 ..... N80-33848* #
NASA-TM-82211 ..... N80-34146* #
NASA-TM-82212 ..... N80-33455* #
NASA-TM-82213 ..... N80-33452* #
NASA-TM-82214 ..... N80-34000* #
NASA-TM-82215 ..... N80-33999* #
NASA-TM-82217 ..... N80-33426* #

NASA-TP-1543 ..... N80-33409* #
NASA-TP-1635 ..... N80-34099* #
NASA-TP-1698 ..... N80-33719* #
NASA-TP-1717 ..... N80-33404* #
NASA-TP-1721 ..... N80-33356* #
NASA-TP-1726 ..... N80-33998* #
NASA-TP-1727 ..... N80-33555* #
NASA-TP-1729 ..... N80-33357* #
NASA-TP-1730 ..... N80-33410* #
NASA-TP-1732 ..... N80-33749* #
NASA-TP-1741 ..... N80-33483* #
NASA-TP-1745 ..... N80-33683* #

NBS-SP-567 ..... N80-34272 #

NBS-TN-1125 ..... N80-34256 #

NBSIR-80-2032 ..... N80-34009* #

NEFES-80-73 ..... N80-33852 #

NIAST-79/154 ..... N80-33729 #

NOAA-NWS-WRCP-9 ..... N80-34052 #

NOAA-S/T-80-281 ..... N80-33836 #

NOAA-TM-ERL-RFC-5 ..... N80-34039 #

NOAA-TM-NWS-WR-151 ..... N80-34039 #

NOAA-TR-ERL-409-GLERL-14 ..... N80-33850 #

NOAA-TR-NESS-81 ..... N80-33836 #

NOAA-80042401 ..... N80-33979* #
NOAA-80050701 ..... N80-33850 #
NOAA-80050901 ..... N80-34039 #
NOAA-80051201 ..... N80-34040 #
NOAA-80051301 ..... N80-34038 #
NOAA-80051302 ..... N80-34052 #
NOAA-80051901 ..... N80-34041 #
NOAA-80052907 ..... N80-34012 #
NOAA-80060202 ..... N80-34011* #

NOR-80-150 ..... N80-33350* #

NOSC/TD-355 ..... N80-33458 #

NOSC/TR-554 ..... N80-33662 #
NOSC/TR-557 ..... N80-34252 #

NP-24333 ..... N80-33010 #

NPL-AR-86 ..... N80-33825

NPS63-80-002 ..... N80-34035 #

NRL-MR-4233-CH-2 ..... N80-33657 #
NRL-MR-4233-CH-3 ..... N80-33586 #
NRL-MR-4233-CH-4 ..... N80-33562 #
NRL-MR-4233-CH-5 ..... N80-33658 #
NRL-MR-4240 ..... N80-33522 #
NRL-MR-4289 ..... N80-34006 #
NRL-MR-4301 ..... N80-33998 #
NRL-MR-4310 ..... N80-34277 #
NRL-MR-4315 ..... N80-34237 #
NRL-MR-4319 ..... N80-33739 #
NRL-MR-4320 ..... N80-33656 #
NRL-MR-4323 ..... N80-33596 #
NRL-MR-4326 ..... N80-33694 #

NRL-8394 ..... N80-33687 #

NSMRL-937 ..... N80-34094 #

NSSDC/WDC-A-R/S-80-03-VOL-1 ..... N80-33997* #

NTIA/REPT-80-38 ..... N80-33391 #

NTIS/PS-78/0596 ..... N80-33390 #
NTIS/PS-78/0560 ..... N80-34053 #
NTIS/PS-78/0586 ..... N80-33918 #
NTIS/PS-78/0609 ..... N80-34128 #
NTIS/PS-78/0609 ..... N80-34129 #
NTIS/PS-78/0610 ..... N80-34130 #
NTIS/PS-78/0610 ..... N80-34131 #
NTIS/PS-78/0612 ..... N80-34132 #
NTIS/PS-78/0612 ..... N80-34126 #
NTIS/PS-78/0613 ..... N80-34127 #
NTIS/PS-78/0615 ..... N80-34133 #
NTIS/PS-78/0689 ..... N80-33923 #
NTIS/PS-78/0690 ..... N80-33924 #
NTIS/PS-78/0718 ..... N80-33386 #
NTIS/PS-78/0735 ..... N80-33389 #
NTIS/PS-78/0768 ..... N80-33809 #
NTIS/PS-78/0782 ..... N80-34194 #
NTIS/PS-78/0831 ..... N80-34299 #
NTIS/PS-78/0831 ..... N80-34300 #
NTIS/PS-79/0515 ..... N80-33390 #
NTIS/PS-79/0539 ..... N80-33918 #
NTIS/PS-79/0563 ..... N80-34053 #
NTIS/PS-79/0723 ..... N80-34130 #
NTIS/PS-79/0725 ..... N80-34128 #
NTIS/PS-79/0725 ..... N80-34129 #
NTIS/PS-79/0725 ..... N80-34131 #
NTIS/PS-79/0727 ..... N80-34132 #
NTIS/PS-79/0728 ..... N80-34126 #
NTIS/PS-79/0728 ..... N80-34127 #
NTIS/PS-79/0730 ..... N80-34133 #
NTIS/PS-79/0750 ..... N80-33386 #
NTIS/PS-79/0762 ..... N80-33389 #
NTIS/PS-79/0779 ..... N80-33607 #
NTIS/PS-79/0780 ..... N80-33923 #
NTIS/PS-79/0782 ..... N80-33924 #
NTIS/PS-79/0796 ..... N80-34194 #
NTIS/PS-79/0804 ..... N80-33809 #
NTIS/PS-79/0841 ..... N80-34299 #
NTIS/PS-79/0841 ..... N80-34300 #

NWSC/CR/RDTR-126 ..... N80-33597 #

ONERA-TN-225 ..... N80-33673

ONR-CR-300-003-1 ..... N80-33417 #

ORO-3992-280 ..... N80-34279 #

OSU-299 ..... N80-33991* #

OTA-E-120 ..... N80-33822 #

OWRT-A-112-MO(2) ..... N80-33851 #

PAPER-13 ..... N80-33777* #

PAR-80-25 ..... N80-34152 #

PB80-189830 ..... N80-33952 #
PB80-190283 ..... N80-34134 #
PB80-190945 ..... N80-33979* #
PB80-192123 ..... N80-33606 #
PB80-192701 ..... N80-33751 #
PB80-192909 ..... N80-33977
PB80-192925 ..... N80-33976 #
PB80-192990 ..... N80-33971 #
PB80-193253 ..... N80-33972 #
PB80-193261 ..... N80-33850 #
PB80-193709 ..... N80-33973 #
PB80-193725 ..... N80-33920 #
PB80-194137 ..... N80-33975 #
PB80-194202 ..... N80-33970 #
PB80-194343 ..... N80-33851 #
PB80-194467 ..... N80-33391 #
PB80-194574 ..... N80-34095 #
PB80-194965 ..... N80-34269 #
PB80-195019 ..... N80-33921 #
PB80-195216 ..... N80-33919 #
PB80-195746 ..... N80-33752 #
PB80-195753 ..... N80-33981 #
PB80-195977 ..... N80-34040 #
PB80-195985 ..... N80-34010 #
PB80-196033 ..... N80-34038 #
PB80-196041 ..... N80-34052 #
PB80-196850 ..... N80-33980 #
PB80-197189 ..... N80-34039 #
PB80-197759 ..... N80-33922 #
PB80-197916 ..... N80-34268 #
PB80-198500 ..... N80-33849 #
PB80-198518 ..... N80-33974 #
PB80-198526 ..... N80-33978
PB80-198799 ..... N80-34009* #
PB80-199136 ..... N80-34012 #
PB80-199482 ..... N80-34041 #
PB80-199805 ..... N80-34267 #
PB80-200025 ..... N80-34011* #
PB80-200488 ..... N80-34272 #
PB80-200785 ..... N80-33810 #
PB80-201783 ..... N80-34256 #
PB80-808529 ..... N80-33915 #
PB80-808537 ..... N80-33916 #
PB80-812415 ..... N80-33389 #
PB80-812571 ..... N80-33386 #
PB80-812597 ..... N80-34128 #
PB80-812605 ..... N80-34129 #
PB80-812613 ..... N80-34130 #
PB80-812621 ..... N80-34131 #
PB80-812639 ..... N80-34132 #
PB80-812654 ..... N80-34133 #
PB80-812688 ..... N80-34126 #
PB80-812696 ..... N80-34127 #
PB80-812712 ..... N80-33390 #
PB80-812878 ..... N80-34053 #
PB80-812886 ..... N80-33917 #
PB80-812894 ..... N80-33918 #
PB80-813090 ..... N80-33607 #
PB80-813165 ..... N80-34299 #
PB80-813173 ..... N80-34300 #
PB80-813298 ..... N80-34194 #
PB80-813363 ..... N80-33923 #
PB80-813371 ..... N80-33924 #
PB80-813447 ..... N80-33809 #

PNL-3353 ..... N80-33605 #

PPG-473 ..... N80-34261 #

PPPL-1671 ..... N80-33564 #

PR-80-1 ..... N80-33996* #

PRRL-80-CR-13 ..... N80-33735* #

P80-10166 ..... N80-33424*
P80-10167 ..... N80-34324*

QPR-4 ..... N80-33479* #

QR-1 ..... N80-33914 #

QTR-18 ..... N80-33456 #

RAD-TN-200-223 ..... N80-34267 #

RADC-TR-80-14 ..... N80-33655 #
RADC-TR-80-33-VOL-2 ..... N80-34160 #
RADC-TR-80-43 ..... N80-33663 #
RADC-TR-80-131 ..... N80-33461 #
RADC-TR-80-132 ..... N80-33695 #
RADC-TR-80-154 ..... N80-34278 #
RADC-TR-80-173 ..... N80-34153 #
RADC-TR-80-176 ..... N80-34152 #

RAE-LIB-TRANS-1897(5207) N80-33673
RAE-LIB-TRANS-1981(5207) N80-34242
RAE-LIB-TRANS-2002 ..... N80-33697
RAE-LIB-TRANS-2029(5207) N80-33483
RAE-LIB-TRANS-2108(5207) N80-33757

RAND/AR-2417-ARMY ..... N80-34034 #

RAND/R-2401-AF ..... N80-34033 #

RANRL-TN-4/80 ..... N80-34080 #

REPT-S-802-77-01/02 ..... N80-33426* #

REPT-2-3621 ..... N80-33497* #
REPT-5 ..... N80-34165 #
REPT-39 ..... N80-33961 #
REPT-119 ..... N80-34051 #
REPT-970-2707 ..... N80-33561 #
REPT-4300 ..... N80-33396* #
REPT-51200 ..... N80-34218* #

RL-CR-80-4 ..... N80-33477 #

RLE-PR-122 ..... N80-34338 #

RLO-1388-443 ..... N80-33667 #

RPI-TR-MP-74 ..... N80-33747* #

RR-79-5 ..... N80-33690 #

R25-40 ..... N80-33962* #
R79AEG552 ..... N80-33408* #
R80-910002-2 ..... N80-33723 #
R80AEG430 ..... N80-33412 #

S/IS-7906 ..... N80-34151* #
S/IS-7907-PT-2 ..... N80-34149 #
S/IS-7908 ..... N80-34150 #
S/IS-7909 ..... N80-34148 #

S/W-PROC-111579 ..... N80-33599 #

SAI-TR-04-165-1-REV ..... N80-33651 #

SAND-79-7052 ..... N80-33911 #
SAND-80-0550C ..... N80-34239 #

SAR-80-10065-02 ..... N80-33621 #

SCIENTIFIC-3 ..... N80-34331 #

SDSU-RSI-79-03 ..... N80-33931* #

SER-510034 ..... N80-33351* #
SER-510039 ..... N80-34217* #

SR-LO-00419 ..... N80-33832* #

SR-PO-00489 ..... N80-33830* #

SRD-80-006 ..... N80-33560 #

SRI-MP-80-72 ..... N80-34270 #

SRI-8052 ..... N80-33977

SR3-80-UA-77 ..... N80-34007 #

SSD-79-0010-2-2 ..... N80-33869* #

SU-IPR-809 ..... N80-34330 #
SU-IPR-813 ..... N80-34329 #
SU-IPR-814 ..... N80-34328* #

SU-SOL-80-17 ..... N80-34154 #

THEMIS-TR-62 ..... N80-34203 #
THEMIS-TR-63 ..... N80-34282 #

TN-1980-3 ..... N80-33665 #
TN-1980-27 ..... N80-33661 #

TOP-1-2-605 ..... N80-33799 #

TR-1 ..... N80-33693 #
TR-2 ..... N80-33599 #
TR-3 ..... N80-33391 #
TR-5 ..... N80-33500 #
TR-6 ..... N80-33574 #
TR-12 ..... N80-33521 #
TR-14 ..... N80-33802 #
TR-15 ..... N80-33803 #
TR-16 ..... N80-33805 #
TR-17 ..... N80-33804 #
TR-44 ..... N80-33809 #
TR-79 ..... N80-33585 #
TR-198 ..... N80-34204 #
TR-211 ..... N80-34105 #
TR-7821 ..... N80-33395 #
TR-10915 ..... N80-33806 #

TRITA-FPT-032 ..... N80-33353* #

TRW-80-03 ..... N80-33492* #

TSC-FAA-80-9 ..... N80-34031 #
TSC-FAA-80-10 ..... N80-33362 #

TSD-T-79106 ..... N80-34163 #

TTOSL-FSR-2 ..... N80-34255 #

TS0-10530 ..... N80-33457* #

UCID-16794 ..... N80-34240 #

UCLA-ENG-8073 ..... N80-33717* #

UCRL-83204 ..... N80-33740 #

UMICH-016294-F ..... N80-33360 #

UMTA-CA-06-0116-80-2 ..... N80-34296* #

US-PATENT-APPL-SN-134865 ..... N80-33857* #
US-PATENT-APPL-SN-167106 ..... N80-34251* #
US-PATENT-APPL-SN-168160 ..... N80-34250* #
US-PATENT-APPL-SN-191744 ..... N80-33679* #
US-PATENT-APPL-SN-513611 ..... N80-33482*
US-PATENT-APPL-SN-616528 ..... N80-33482*
US-PATENT-APPL-SN-784245 ..... N80-33482*

US-PATENT-CLASS-75-200 ..... N80-33482*
US-PATENT-CLASS-75-222 ..... N80-33482*

US-PATENT-4,214,995 ..... N80-33482*

USAAVRADCOM-TR-80-D-4 ..... N80-33422 #
USAAVRADCOM-TR-80-D-13 ..... N80-33403 #

USARTL-TR-79-22C-VOL-3 ..... N80-33385 #

UTEC-80-092 ..... N80-34267 #

UTRC/R-80-914389-18 ..... N80-33501 #

UW-TR-220 ..... N80-34253 #

VPI-E-80-17 ..... N80-33810 #
VPI-E-80-26 ..... N80-33495* #

VTR-80-06 ..... N80-34207 #

WES/TR/HL-80-11 ..... N80-34029 #

WHOI-80-24 ..... N80-34010 #

W80-05483 ..... N80-33851 #

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to eleven special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley
COLORADO
University of Colorado, Boulder
DISTRICT OF COLUMBIA
Library of Congress
GEORGIA
Georgia Institute of Technology, Atlanta
ILLINOIS
The John Crerar Library, Chicago
MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge
MISSOURI
Linda Hall Library, Kansas City
NEW YORK
Columbia University, New York
OKLAHOMA
University of Oklahoma, Bizzell Library
PENNSYLVANIA
Carnegie Library of Pittsburgh
WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library
COLORADO
Denver Public Library
CONNECTICUT
Hartford Public Library
MARYLAND
Enoch Pratt Free Library, Baltimore
MASSACHUSETTS
Boston Public Library
MICHIGAN
Detroit Public Library
MINNESOTA
Minneapolis Public Library
MISSOURI
Kansas City Public Library
St. Louis Public Library
NEW JERSEY
Trenton Public Library
NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library
OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library
TENNESSEE
Memphis Public Library
TEXAS
Dallas Public Library
Fort Worth Public Library
WASHINGTON
Seattle Public Library
WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy of microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESA - Information Retrieval Service, European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France.

National Aeronautics and
Space Administration

Washington, D.C.
20546

Official Business
Penalty for Private Use $300

SPECIAL FOURTH CLASS MAIL
Book

Postage and Fees Paid
National Aeronautics and
Space Administration
NASA 451

U.S. MAIL

POSTMASTER: **If undeliverable (Section 158 Postal Manual) Do Not Return**

C21